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Business Staff on Page 4

XT WEEK . . .

Heat Treating High Speed Steels
Riveting, Spotwelding Magnesium
Blast Furnace Thermal Requirements
Control of Vibration
British Lathe Design

STEEL

The Magazine of Metalworking and Metalproducing

VOL 120, NO. 8 FEBRUARY 24, 1947

NEWS

★ As the Editor Views the News 39
Railroad Equipment Industry Prospects Are Promising 43
Steel Payrolls in 1946 Set Peacetime Record; 90% Greater than 1939 45
★ Present, Past and Pending 45
See Fight for West Coast Steel Market Developing 46
California Industrial Progress Reflected in New Developments 47
Automotive Industry Widens Lead as Consumer of Finished Steel 48
Steel Price Extras. . . . What They Are and Why 49
Allot $448 Million for Steel Plant Expansion 50
WAA Approves Discount Plan for Surplus Tools for Resale 50
Wider Use of Forgings Noted 51
★ Windows of Washington 52
Scope and Character of New Labor Laws Crystallizing in Congress 55
Plan Huge Modernization Program for Wales Sheet, Tin Plate Industry 57
★ Mirrors of Motordom 59
Plan Betterment of Babcock & Wilcox Plant at Barberton, O. 62
★ Briefs 63
★ The Business Trend 64
★ Men of Industry 66
★ Obituaries 71
★ Construction and Enterprise 164

TECHNICAL

Inspecting Metals with Supersonics 72
Control of Vibration Can Increase Production Efficiency—Part II 76
Flux-Injection Cutting Stainless Steels 80
★ Seen and Heard in the Machinery Field 84
★ Engineering News at a Glance 86
Western Metal Congress and Exposition 91
Precise Manufacture Minimizes Service Failure of Clutch Springs 100
★ Progress in Steelmaking—Selecting Correct Steel Mill Lubricants 106
★ New Products and Equipment 129
★ Helpful Literature 135

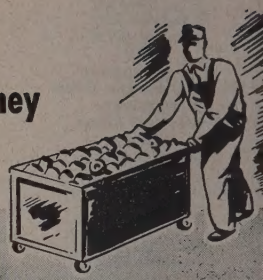
MARKETS

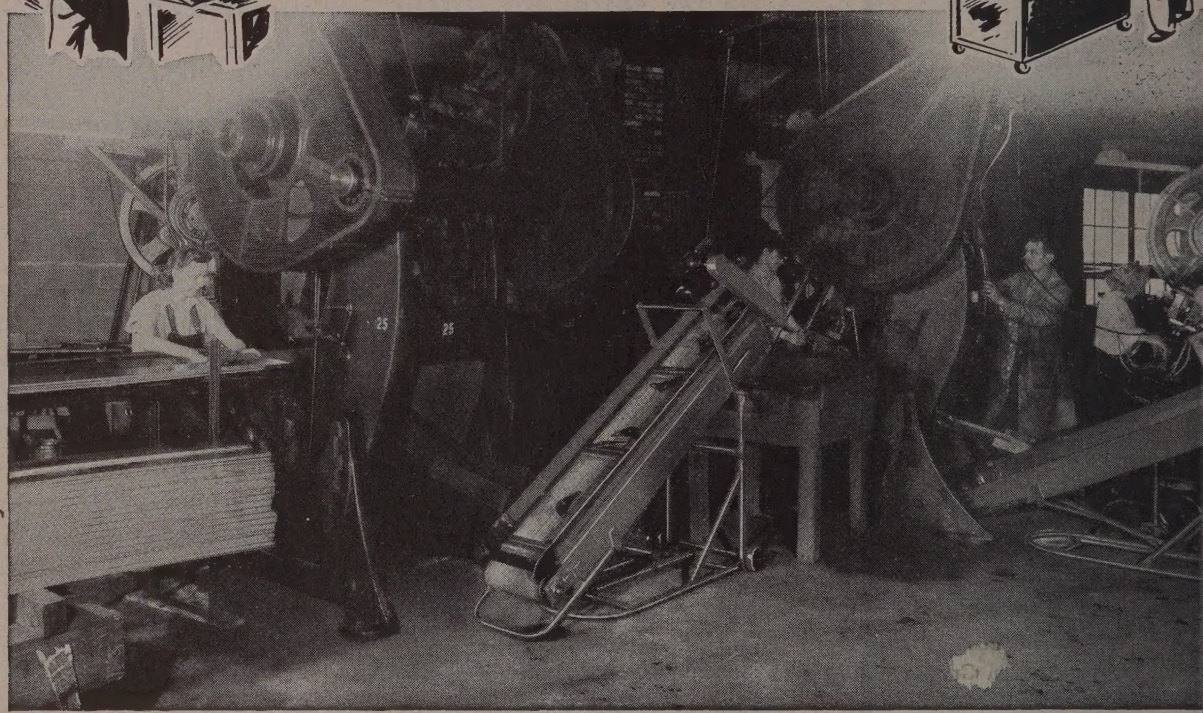
Booming Steel Operations Brighten Supply Prospects 139
★ Market Prices and Composites 140
Nonferrous Metal Resources To Be Surveyed 144

★ *Index to Advertisers* 170

★ Denotes regular features.

These men are wasting their time and your money





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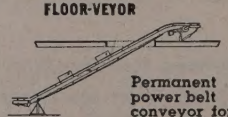

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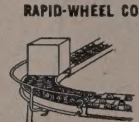

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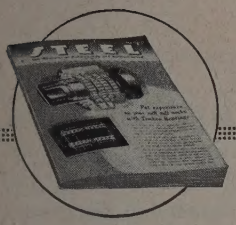


February 24, 1947

One Dose At a Time

Hearings now being conducted by the Senate and House labor committees afford an illuminating demonstration of how democracy works in America. In few nations in the world today could a controversial subject be debated as frankly as labor legislation is being discussed in the testimony offered before these committees.

Consider the arguments presented by employers. They range all the way from recommendations that would curb union power drastically to mild wrist-slapping proposals that would warn unions that they are abusing their prerogatives. In between the extremists are realists who, basing their arguments upon specific situations, give the lawmakers facts which should help them to revise laws constructively. Testimony of the Non-Basic Steel Co-ordinating Committee falls in this category of realism. It shows convincingly how 1100 steel-using companies employing 350,000 persons have been victimized by the mass attack of unionism upon industry which does not take into account the peculiar features of labor relations which are distinctive to each individual company. The committee's testimony that its members have been victims of "collective bludgeoning" and not the beneficiaries of collective bargaining will weigh heavily with legislators.

Thus far the testimony of union leaders has been unimpressive and disappointing. William Green and Philip Murray have argued earnestly that unions be permitted to hold recent gains and they have been woefully weak in explaining why admitted abuses of union power should not be curbed in the public interest. In fact, their testimony has been so flimsy that—unconsciously or not—they have left the field wide open for the opportunist John L. Lewis to come forth with a grandstand play, when he testifies.

However, representatives of employers and of union employees are biased principals. Almost forgotten in the hearings is the viewpoint of the public and of employees who do not belong to unions. These millions of persons must depend upon their elected Senators and Representatives to protect their interests. Fortunately most of these legislators feel that the vote of last Nov. 5 was a mandate to correct labor union abuses.

Consequently there will be legislation that will curb the power of unions. It will not settle the problem finally. It will simply reverse the trend, placing unions in a position of declining instead of ascending authority.

This is in conformity with the American way. Our nation functions on a homeopathic rather than an allopathic basis. We seldom cure with one dose of medicine. The forthcoming reform in labor legislation is but one of several corrective measures that will be prescribed.

• • •

SCRAP ALL CONTROLS! Automobile manufacturers are deeply concerned about the increasing shortage of pig iron. Through George W. Mason, president of the Automobile Manufacturers Association, they have appealed to Maj. Gen. Phillip B. Fleming, administrator of the Office of Temporary Controls, for an immediate termination of government allocation and priority controls. They contend that the key to the exasperating pig iron situation "is the allocations to housing purposes, which seem to exceed present realistic housing completion schedules."

This complaint ties in with claims of many other consumers of pig iron that government allocations of iron for soil pipe, bath tubs and other housing items go far beyond requirements. The problem is complicated by the fact subsidies are paid to some high-cost blast furnaces to produce this ear-marked housing iron.

A somewhat similar situation exists in govern-

(OVER)

ment allocations of steel for freight cars. Under protest, CPA has arranged for a voluntary allocation of steel for car construction and repair. It is said that this may be the final government-sponsored allocation of the reconversion period.

If true, this end of allocations is good news. At this stage, government priorities do more harm than good. We are at a point where the ingenuity and resources of private buyers and sellers can be much more effective in getting beneficial results than can ponderous, inflexible directives issued from Washington. —pp. 54, 59

* * *

THE "ABC" OF EXTRAS: Recent revision of extra cards applying to many rolled steel products has revived interest in the subject of extras on the part of most buyers and sellers. The word "revived" is used advisedly, because the importance of extras in relation to base prices does not remain constant. There have been times when extras have been waived or ignored to such an extent that the buyer has not been unduly conscious of the extent to which they increase the cost of product above the base price. Right now extras may up the delivered price to double or more the published base price.

Under these conditions it may be well for interested persons to go back to fundamentals. We present in this issue a discussion of extras in simple terms. It is elementary in the extreme, but it may help somewhat in clearing up some of the misunderstandings that cloud the present price situation.

* * * —p. 49

ANTI-BUSINESS POISON: Manufacturers of railroad equipment see a number of years of peak production ahead, complicated chiefly by difficulties in obtaining necessary materials. Accumulated demand is heavy not only for motive power and rolling stock, but also for track and accessories and numerous other items.

The outlook has been made much more promising by the belated action of the Interstate Commerce Commission in granting increased freight rates effective last Jan. 1. However, this lift to railroad income, authorized to compensate the roads for increased wages and other costs incurred many months previously, did not arrive in time to save the carriers from acute financial difficulties. The best indication of this is the deficit reported by the Pennsylvania Railroad Co. for 1946, after an unbroken record of 99 successive years of profitable operation.

This reflects the extent to which even an old-line government commission such as ICC can be affected by New Deal anti-business poison. A powerful antidote should be administered immediately. —p. 43

SIGNS OF THE TIMES: Motor carriers transported more freight in December, 1946, than in any December on record (p. 64) and the total for the year was the highest ever recorded in any peacetime year. . . . Dehumidification machines, used extensively by the United States Navy in its fleet preservation program known as "Operation Zipper" (p. 86), now are available on a commercial basis to industrial customers. . . . Fifth Western Metal Congress and Exposition to be held at Oakland, Calif., for six days beginning March 22 (p. 91) is expected to attract 40,000 scientists, engineers and executives. The event is sponsored by the American Society for Metals, with 16 technical societies co-operating. Products of 172 companies will be exhibited in the exposition, which will be housed in the two Oakland Civic Auditoriums. . . . Departure of William L. Batt from Washington on Feb. 14 to resume his position as president of SKF Industries Inc. on a full-time basis (p. 54) marks the end of an unusually long period of government service for an industrial executive. In 6½ years, starting in 1940, Mr. Batt held numerous top posts in government pertaining to industrial mobilization before, during and after the war. . . . Steel Co. of Wales, a new $200 million company to be formed to carry out an ambitious plan for modernization and development of the sheet and tin plate industry of South Wales (p. 57), will build a new hot strip mill at Port Talbot and cold reduction mills at Llanelly, Swansea and Port Talbot. The program is rated by the co-operating companies as the largest in scope and expenditure ever undertaken by British industry. At this distance, this project looks like the type of improvement which, if launched earlier, might have saved Britain from some of its present difficulties. . . . Some automobile foundries, finding the coke shortage almost as disconcerting as the famine in pig iron (p. 59), are resorting to admixtures of coal in their cupola fuel and are considering other expedients in efforts to reduce the coke ratio. This, however, is only one of many headaches currently suffered by foundrymen. . . . Proposed reduced freight rates on steel from Geneva, Utah, to Pacific Coast consuming centers have stirred up a hornet's nest. Kaiser interests and eastern independent steelmakers oppose the new rates (p. 46), while U. S. Steel and some coast consumers defend them. This is the inevitable prelude to a competitive drive for advantage in West Coast markets.

E. L. Shaner

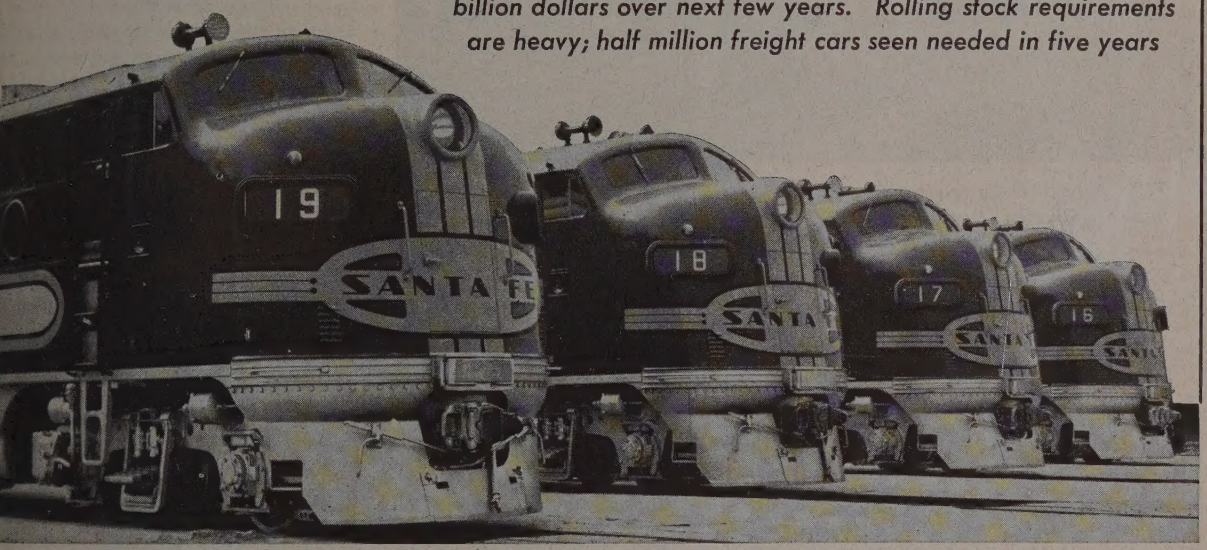
EDITOR-IN-CHIEF

STEEL
February
24
1947

Railroad Equipment Industry Prospects Are Promising

By VANCE BELL
Associate Editor, STEEL

Freight rate increase will help carriers finance large replacement and rehabilitation program which may amount to several billion dollars over next few years. Rolling stock requirements are heavy; half million freight cars seen needed in five years



More and more diesel-electric power will be utilized on the railroads for diesel-electrics are the choice in 95 per cent of the domestic demand for locomotives

SEVERAL busy years appear to be in tore for railroad equipment manufacurers, now that the carriers have made substantial start on a long-overdue reabilitation program.

For 15 years the equipment needs have been accumulating and fulfillment of hem would involve expenditures totaling everal billion dollars.

The needs began developing during he depression years when equipment replacements were curtailed sharply, and hen pyramided during World War II vhen replacements were severely retricted. Rising operating costs after he close of the war made railroads hesiant to order new equipment, and maerials shortages further checked imrovement programs.

However, 1947 started off more auspiiously in the railroad field. Freight ates were increased an average of 17.6 er cent Jan. 1. Industry in general is opeful there will be no recurrence of ast year's paralyzing industrial strikes nd that the materials and supplies situtions will improve steadily.

An indication the railroads are now moving forward in an equipment replacement program is the Interstate Commerce Commission report that the railroads are spending $228 million on road and equipment in the first quarter of 1947, compared with only $100 million in the corresponding period of 1946. Of the current quarter's total, $175,600,000 will be for equipment and $52,400,000 for road. For all of 1946, capital expenditures were estimated at $565,500,000, of which $338 million was for equipment. In 1945, the roads spent $549,500,000 for additions and betterments, the equipment portion totaling $309,400,000.

Outstanding among replacement needs is rolling stock. The American Railway Car Institute, New York, estimates construction of an average of 100,000 cars a year for the next five years will be necessary. At an average of $4200 a car, 100,000 freight cars would cost $420 million annually, and would require 2,160,000 tons of iron and steel.

Passenger car requirements, according to the institute's estimates, will be 2000 cars a year over the next ten years. At an average of $90,000 per car, considering all types of sleepers, diners, coaches, etc., the annual expenditures would approximate $180 million.

Expenditures for rolling stock would be boosted substantially by purchases of new locomotives, there being 564 locomotives of all types on order at the end of November.

A vast program of construction of rolling stock would spur demand for the numerous components that go into making a car ready for service. To obtain full efficiency from new rolling stock, railroads would have to install much other new equipment, such as signaling apparatus, and would have to replace rails and renew roadbeds. A comprehensive rehabilitation of the nation's railroads would involve expenditures running into the billions of dollars.

American Railway Car Institute reports freight car orders placed in January totaled 9905, compared with a monthly average of 5744 during 1946. Of the new orders, 3400 are box cars and 4842 are hoppers. Orders for these types have been increasing during recent months

With railroads badly in need of new rolling stock, car rebuilding takes on additional significance. Here newly rebuilt coal cars are being lettered in the Russell, Ky., car shops of the Chesapeake & Ohio Railway

because of existing shortages. Now more than 20,000 box cars and 18,000 hoppers are on order.

Total backlog of freight car orders as of Feb. 1 was 75,578, including orders placed with the car building industry and in railroad shops, compared with 40,670 a year ago.

However, as to production, January was disappointing, said S. M. Felton, president of the railway car institute. Deliveries totaled only 2982, of which 1227 were box cars, as contrasted with a potential capacity production by the car builders of 14,000 cars monthly.

An idea of the magnitude of the rehabilitation program now unfolding can be gained in a statement from the Pullman-Standard Car Mfg. Co., Chicago, that its backlog of orders for railroad passenger and freight, as well as city transit, equipment exceeds $250 million, a peacetime record. Included in that backlog are 1600 lightweight railroad passenger cars, and 25,784 railroad freight cars.

In commenting on the future, Pullman-Standard says, "Prospects for an impressive increase in orders for railroad equipment have been given impetus by the increase in railroad freight rates that went into effect Jan. 1. Almost coincident with its approval by the ICC, orders for $25 million in new freight cars were placed with the carbuilders, with several other large commitments since then. Considering that the railroads started 1947 with fewer freight cars than they owned at the beginning of 1946 and that freight shipments show no signs of a let-down, there is all reason to believe that a good share of the railroad freight revenue increment will be converted into new rolling stock to take up this slack.

"The passenger car outlook is equally promising," said Pullman-Standard. "For almost four years during the war not a single railroad passenger car was built in this country. Not only must the railroads make up for this gap but there is also the urge to replace outmoded cars as rapidly as possible as one way of offsetting the growing competition from airlines and other forms of transportation. Thousands of new cars, embodying all the latest in passenger attraction, must be built.

"With a smoother flow of essential materials in adequate volume, and freedom from strikes in major industry, there is reason to look for car shipments in the first half of 1947 nearly doubling the total output of the last half of 1946. The outlook is dependent on correction of the shortages of steel and other essential materials that disrupted production accomplishment last year.

"In Pullman-Standard's planning, it is prepared to make the most of the greatest production capacity in its history. Millions have been spent since the war in modernizing its various manufacturing properties.

"In 1946, Pullman-Standard's output of railroad passenger cars was close to 300. While this might have seemed to compare favorably with the 305 cars turned out in 1937—the company's biggest previous year since its construction of the first lightweight, streamlined passenger cars in 1934—it was far behind what the company had hoped to achieve as its contribution in the record-breaking modernization program of railroads. Recently, as the general si ation throughout industry has improv Pullman-Standard has been able to s up output, leading to the hope t eventually affairs may be brought to stage where it can come closer to production capacity of 2000 modern c annually, for which its Chicago a Worcester, Mass., passenger car pla are now geared," the company said.

The company's freight car plants in about the same position. "Here, t inability to get essential supplies on ti and in required volume, has been a s ous handicap. For the greater part 1946, at the shops at Michigan C Ind., Butler, Pa., and Bessemer, A material shortages, notably steel, h production down to about one-third their capacities.

In regard to materials, Pullman-Sta ard said little progress has yet b made in the window glass, air conditi ing equipment, electrical supply and holstered furniture fields, where ba delayed deliveries still make for some Pullman-Standard's most acute proble

Despite materials shortages, Pullm Standard is preparing for record-bre ing production levels and is recruit additional workers. In recent mon Pullman-Standard payrolls have spiral with some plants now at new peaceti peaks in employment. Although company has conducted intensive ca paigns to obtain additional employe it will take some time to assemble ultimate in skilled working forces n deemed necessary to fill the back of orders and the sizable orders ant pated in the future, the company p dicted.

Railroad Suppliers Optimistic

Also reporting a bright outlook business is the Buda Co., Harvey, manufacturer of railway supplies. T company's present orders and shipme are considerably above those of year and also above any prewar y The company is having considerable d culty obtaining sufficient materials make maximum shipments but, said B. Fisher, vice president, "our shipme are being maintained at a very sa factory figure." He looks for satisfact business in the foreseeable future p vided the labor situation continues fa able and the railroads are able to m satisfactory earnings.

The Griffin Wheel Co., Chicago, ma facturer of chilled iron railroad car whe likewise looks hopefully into the fut Said E. P. Waud, president, "the look for business is very good, as ap ently there is every indication of a la railroad equipment building progr We look forward to at least an 80

cent capacity business during this year, and that is above normal."

New York Air Brake Co., New York, reports new orders are keeping pace with deliveries, while the backlog of orders represents more than seven months' shipments. The company said its outlook appears good not only on the basis of prospective placing of new freight car orders on a substantial scale but also because there still remains a sizable volume of business in connection with mandatory replacement of old-style brakes.

General Steel Castings Corp., producer of railway castings, Eddystone, Pa., has found it expedient to return to a five-day week basis at both its foundry and machining departments. Last fall the company increased operations in its machining department to six days a week to boost output of trucks for railroad passenger cars, but it has returned to a five-day week because it became evident that car builders would not get all the materials needed to fill original schedules. The company has an order backlog sufficient to keep it busy seven or eight months at the current rate of operations.

An important development in the railroad equipment field is the trend toward diesel-electric locomotives. Robert B. McColl, president, American Locomotive Co., New York, pointed out that of all domestic locomotive orders approximately 95 per cent now are for diesel-electrics. To help fulfill the demand, American Locomotive has developed assembly-line methods for producing diesel engines, and today the research and changeover of plants for mass production represents an investment of $20 million by the company.

Large-Scale Dieselization Seen

Discussing the move toward diesel-electric locomotives, N. C. Dezendorf, director of sales and service of the Electro-Motive Division of General Motors Corp., revealed recently that his company has been invited to co-operate with 10 class 1 railroads in the preparation of studies for 100 per cent dieselization.

Supplementing the vast pool of potential domestic business is foreign demand. Just recently the Whitcomb Locomotive Co., a subsidiary of the Baldwin Locomotive Works, Eddystone, Pa., received from the Argentine State Railway a $22 million order for 90 diesel-electric locomotives. The potential foreign market for railroad equipment has been estimated at around $200 million a year for five years. However, the extent to which this market will develop for American companies depends on several factors, one of the most important being the ability of foreign purchasers to make suitable financial arrangements.

Steel Payrolls in 1946 Set Peacetime Record; 90 Per Cent Greater than 1939

PAYROLLS in iron and steelmaking plants in 1946 set a peacetime record of $1,544,142,000, according to the American Iron & Steel Institute. The total was 90 per cent more than the $812,775,000 paid in 1939.

The steelworkers' strike and the two coal strikes last year caused total payroll to decline 6.1 per cent below the 1945 total of $1,645,332,700.

Average hours worked per week during 1946 for all employees fell to 36.1 from 44.2 in 1945. Although an 18.5 cents per hour wage increase was granted in February, 1946, hourly, piecework and tonnage wage earners of the industry received $1,208,259,000 during 1946, compared with $1,351,461,600 in 1945.

Hourly earnings of wage earners only during 1946 averaged approximately 134.7 cents per hour, a record, compared with an average of 124.8 cents per hour in 1945, 95.9 cents per hour in 1941, and 84.2 cents per hour in 1939, the institute reported.

The average number of employees at work in the iron and steel industry in 1946 totaled 575,300, compared with 551,200 average in 1945.

New monthly records were established during 1946 in payrolls, earnings and employment. In November, average hourly earnings for steelworkers hit the high figure of 136.7 cents, and total number of employees hit the peacetime record level of 600,000. Total payrolls in October at $150,637,500 set a new peacetime record.

In December, the effects of the second coal strike of the year reduced total payrolls to $137,216,500 from $143,440,700 in November. Average number of employees dropped to 594,200 from November's 600,000, and average hours per week per employee declined to 36.5 from 38.7 in November.

Present, Past and Pending

■ CLEVELAND CLIFFS COMPANIES TO CONSOLIDATE

CLEVELAND—Cleveland Cliffs Iron Co. and Cliffs Corp. will be consolidated under the name of Cleveland Cliffs Iron Co. Merger proposal provides stockholders in Cliffs Corp. will receive 2¼ common shares in the new company, and holders of Cleveland Cliffs 5 per cent preferred will receive one share of 4½ per cent preferred and one share of common in the new concern.

■ KAISER TAKES OVER FARM IMPLEMENT UNIT

DETROIT—Formation of the Frazer Farm Equipment Corp. to take over the manufacture of farm equipment previously made by Graham-Paige Motors Corp. has been announced by Kaiser-Frazer Corp.

■ SURPLUS CHICAGO CASTINGS PLANT GOES BEGGING

CHICAGO—For the second time, War Assets Administration has failed to attract bids for purchase or lease of the $26 million government-owned surplus cast armor and steel castings plant in East Chicago, Ind., operated during the war by American Steel Foundries.

■ BERGER DIVISION COMPLETES PLANT RECONVERSION

CANTON, O.—Reconversion of the Berger Mfg. Division No. 2 plant, Republic Steel Corp., for the production of kitchen cabinets has been completed, although shortage of steel is holding employment to about 50 per cent of expected maximum. During the war, this plant produced bomb bay doors, wing flaps and stabilizers for the Consolidated B-24 and B-32 aircraft.

■ RHEEM SINGAPORE PLANT IN PRODUCTION

NEW YORK— First production of steel drums at the new Rheem-Hume Singapore plant of Rheem Mfg. Co. is under way. Rheem now is manufacturing steel drums in five foreign plants.

■ FRANCIS NAMED ALAN WOOD SALES MANAGER

CONSHOHOCKEN, PA.—P. L. Francis has been appointed general manager of sales, Alan Wood Steel Co., succeeding in duties the late Willard S. Haring.

■ H. L. RANDALL, RIVERSIDE METAL HEAD, DIES

RIVERSIDE, N. J.—H. L. Randall, president, Riverside Metal Co., died Feb. 16.

Automotive Industry Widens Lead As Consumer of Finished Steel

Warehouses receive larger tonnage in October, but smaller percentage of total shipments. Construction and maintenance holds second place as consumer, with rail transportation third, and containers in fourth position

BUILDERS of automobiles, trucks, parts and accessories continued as the leading consumer of steel products in October, according to the American Iron & Steel Institute's analysis of distribution.

The automotive industry, excluding tractors, accounted for 666,653 tons of finished products in October, 12.7 per cent of the total of 5,246,544 tons. This compares with 577,382 tons, or 12.6 per cent of the total, in September. For the first ten months of 1946, the auto industry received 4,490,486 tons, 11.2 per cent of the total of 39,865,391 tons.

Construction and maintenance was the second largest outlet for steel products in October, as it has been in recent months. Rail transportation continued in third place and containers in fourth. For ten months, containers were the third largest consumer and rail transportation was fourth.

Steel warehouses received a larger tonnage of steel in October with 850,063 tons than in September with 810,600 tons. However, their percentage of the output dropped from 17.7 to 16.2. During the first ten months of the year, warehouses distributed 18.3 per cent of all finished steel, or 7,193,940 tons.

The rankings of consuming industries for the first ten months were unchanged from September, and were in the following order: 1. Automotive; 2. construction; 3. containers; 4. rail transportation; 5. machinery, industrial equipment and tools; 6. contractors' products; 7. domestic and commercial appliances; 8. appliances, utensils and cutlery; 9. electrical equipment and machinery; 10. agricultural equipment; 11. shipbuilding; 12. oil and gas drilling; 13. mining, quarrying and lumbering; 14. ordnance and other military; 15. aircraft. These 15 classifications exclude warehouses, converters and processors and exports as not being end consumers.

Steel Distribution, Ten Months, 1946

(Leading products of all grades including alloy and stainless)

Market Classification	Net Total All Products (in net tons)
Converting and processing	3,712,760
Jobbers, dealers, distributors	7,193,940
Construction, Maintenance	3,673,500
Contractors' Products	1,252,527
Automotive, excl. tractors	4,490,486
Rail transportation	2,998,029
Shipbuilding	233,094
Aircraft	19,068
Oil, gas drilling	197,128
Mining, Quarrying, Lumbering	147,818
Agricultural	828,498
Machinery, Industrial equip., Tools	1,835,763
Elect. machinery, Equipment	900,972
Appliances, Utensils, Cutlery	974,734
Other domestic, Commercial Appliances	1,096,491
Containers	3,366,180
Ordnance, Other Military	26,673
Unclassified	4,653,801
Export	2,263,929
Total	39,865,391

U. S., Canadian Firms Join To Operate Brass Plant

Noranda Mines Ltd., Toronto, Canada, has purchased from Canada's War Assets Corp. the Canada Strip Mills plant at Montreal East, James Y. Murdock, president of Noranda, announced recently.

A new company, Noranda Copper & Brass Ltd., is being formed to operate the plant. Bridgeport Brass Co., Bridgeport, Conn., will be associated with Noranda Mines in its operation. Noranda Mines will have financial control, and Bridgeport Brass will have a substantial minority interest, Mr. Murdock said.

The plant, which was built during the war for production of brass strip for munitions purposes, is being converted to production of commercial copper and brass products.

Management of the new company will be directed by Herman W. Steinkraus, president of Bridgeport Brass. Mr. Murdock will be chairman of the board.

Distribution of Steel Products—October, 1946

(In net tons of leading products of all grades of steel, including alloy and stainless)

Market Classification	Shapes	Plates	Hot Rolled Bars	Cold Finished Bars	Seamless Tubing	Drawn Wire	Hot Rolled Sheets	Cold Rolled Sheets	Coated Sheets	Hot Rolled Strip	Cold Rolled Strip	Total (all Products)
Converting and Processing	5,291	36,410	212,669	14,365	11,028	75,519	68,097	2,387	970	29,959	8,525	903,828
Jobbers, Dealers, Distributors	70,136	69,513	97,768	50,963	71,123	16,962	74,902	35,351	39,474	11,650	3,689	850,063
Construction, Maintenance	168,364	104,892	29,783	615	36,545	1,669	25,372	3,613	12,892	7,202	2,120	506,971
Contractors Products	1,412	10,878	17,900	1,133	5,451	3,085	56,795	30,490	29,763	8,552	5,731	186,640
Automotive, excl. Tractors	3,752	21,286	143,137	24,569	2,227	19,672	156,497	180,762	8,590	51,758	25,180	666,653
Rail Transportation	48,496	65,581	35,020	952	1,054	274	23,263	1,925	4,392	4,567	623	420,505
Shipbuilding	5,150	26,333	2,385	251	80	61	1,259	146	599	82	.....	36,821
Aircraft	.....	20	114	192	305	11	105	98	89	473	140	1,823
Oil, Gas drilling	2,810	6,452	6,919	947	5,021	14	1,305	.....	.....	115	.....	31,830
Mining, Quarrying, Lumbering	1,866	3,618	5,611	246	216	170	1,565	183	21	487	19	18,406
Agricultural	5,233	7,464	42,882	6,292	479	2,322	12,252	3,714	8,879	9,455	360	106,844
Machinery, Industrial Equipment, Tools	22,056	53,878	65,958	28,898	13,870	9,409	28,527	4,770	1,850	11,405	5,062	271,671
Elec. Mach., Equipment	3,101	9,506	12,399	4,649	163	3,739	23,888	8,533	2,119	7,427	4,708	128,333
Appliances, Utensils, Cutlery	88	1,289	1,372	3,659	418	3,734	20,492	50,684	8,341	3,535	7,123	122,895
Other Domestic, Commercial Equipment	1,708	9,565	8,993	5,311	634	24,064	23,294	32,371	4,556	8,614	13,814	146,920
Containers	31	18,951	2,613	12	289	9,071	56,484	21,286	3,464	15,085	8,752	378,596
Ordnance, other military	51	85	23	242	5	50	175	12	13	.....	.....	715
Unclassified	22,322	12,715	97,317	11,648	34,389	71,614	57,459	51,831	7,847	2,694	46,464	651,468
Export	25,537	28,020	22,473	3,412	18,298	26,059	20,828	10,364	6,377	5,177	1,022	244,358
Total	387,302	486,456	805,336	158,356	201,595	215,381	652,557	438,520	140,236	178,237	133,332	5,675,336
Less shipment to members of industry for conversion	59	18,787	89,627	116	10,406	9,872	43,561	271	297	20,949	1,701	428,792
Net Total	387,243	467,669	715,709	158,240	191,189	205,509	608,996	438,249	139,939	157,288	131,631	5,246,544

Steel Price Extras

....What They Are and Why

By ERNEST NEWMAN

ANYONE with an inquiring turn of mind who has had occasion to buy steel products, has probably been ruck by the seeming wide discrepancy etween the unit price which he may ave read in the market section of this agazine, and those he found in quota- ons or on his invoices for the goods elivered at his plant.

Instead of getting his material at the ublished prices, his invoices invariably owed delivered costs at maybe from as uch as up to twice the magazine-quot- d prices to even higher if he had de- anded extra refinements and close in- ection—all dependent upon the prod- ct, the base price and the size and quan- ty ordered.

In the steel industry, the base price of ny product means the base price for ch product fob a basing point before ny extras in respect to such product are dded, or any discounts for early pay- ent, or deductions for increased quan- ty over base, are allowed or made.

BASING POINTS are generally the eographical centers of production of ne or more of the diversified products f the steel industry, usually though not lways near the areas of the large inte- rated mills or secondary operators.

BASE PRICES are what might be alled—without being in any way face- ous—run-of-the-mill prices. They are ot hedged about with any refinements ch as quality, heat treatment, special nish, etc., and are based on customers lacing orders of a sufficient quantity in ose sizes which allow the manufacturer produce most economically by long ns without changing of rolls, on heats f standard grades with ordinary check nalysis requirements. Briefly, base rices are applied to those sizes which an be produced by good average mill ractice with the least loss of ingot and e least expenditure for labor, mate- als, inspection, packing and shipping.

PRICES quoted are those ruling at e time of publication and are the prices which, over a long period of time, eel producers and converters in various arts of the country have found to be the ost economical sizes to make in that articular type of product.

The answer to the difference in the ublished and delivered prices lies in the ditions to the base price of what are own in the industry as extras, which e a legitimate increase over the base rice, incurred by the imposition of ad- tional refinements beyond those neces- tated by the run-of-the-mill products.

EXTRAS in one form or another apply more or less in all industries. The housewife who sends the household wash to the laundry gets it done at a certain figure if she is satisfied to have it only rough-dried; if in addition she wants it ironed, she pays an extra amount over the rough-dry cost. In the woodworking industry a plain-sawed piece of lumber might be considered as purchasable at a base price. If the customer wants it p-2-s—planed two sides—he pays an increase in price; for p-4-s—planed four sides—he pays a still further increase in price. In both these examples the extras for the additional operations are hidden in the increased cost which is set at whatever the traffic will bear and differs in different localities.

In the steel industry, both in this country and abroad, all steel products are sold on a base price plus extras dependent upon quantity, size and additional refinements and operations. In America the extras, which are more or less uniform throughout the industry, are all open and above-board and are published in some form or another by all steelmakers, converters and warehousemen. They are essentially the same as those imposed on the steel industry under the code of fair competition in effect during the operation of the National Recovery Act.

During the past few years new steel products have been developed and improvements made in the old products, which have brought new practices into use in their manufacture, testing, inspection, packing and shipping. Today there are many special requirements, singly or in combination, demanded by customers for special-purpose products, which directly affect the complex interrelationship between metallurgical, mechanical, handling and inspection procedures in their production, which result in what are considered as special or restrictive conditions; and there are various shapes, and sizes above and below the base sizes which must be classed as special.

Specific demands for chemical and physical test limitations, or for dimensional tolerances not in accordance with standard specifications complicate manufacturing operations and increase the risk of failure to meet the requirements imposed.

SIZE AND SHAPE may involve metallurgical, mechanical and handling problems; and special qualities of varying degrees of superiority require extra metallurgical control and closer inspection to keep down rejections.

The following are examples of extras over base which are applicable to hot-rolled carbon bars: Size, cutting, quantity, straightening, treatment, finish, chemical requirements, quality, non-standard specifications, physical test, inspection and close tolerance. Alloy steel bars take all the above with additional ones for alloy content, cracker cutting, grinding billets, extensometer, magniflux, stamping heat numbers, centerless grind-

(*Please turn to Page* 160)

Steel Price Extra Data

For details on extras on specific products refer to the following recent issues of STEEL:

Feb. 3, pp 67-178 (C. R. Strip); Feb. 3, p 67 (H.R. carbon sheets); Jan. 27, p 47 (electrical sheets); Jan. 27, p 46 (structural shapes); Jan. 20, p 45 (forging quality semi-finished).

Jan. 20, p 45 (H.R. carbon plates); Jan. 20, p 46 (H.R. bars): Jan. 13, p. 55; Dec. 30, p 42 (H.R. alloy bars); Dec. 30, p 42 (C. F. carbon bars); Dec. 30, p 43 (H.R. bars); Dec. 23, p 30 (H.R. sheets and strip).

In the Mar. 3 issue, STEEL will describe the present freight rate structure applying on steel products and raw materials.

Allot $448 Million for Expansion

Steel companies plan to spend record amount in 1947 for new equipment and facilities. Large portion to be for sheet, strip capacity

STEEL producers are planning to spend a record amount, $448 million, in 1947 for new equipment and facilities. This represents a 54 per cent gain over 1946 expenditures of $291 million out of a total original appropriation of $327 million. A portion of the 1947 funds represents a carryover from 1946 when strikes and materials shortage delayed the delivery of much equipment which the steel industry had expected to install, explains the American Iron & Steel Institute.

The 1947 appropriation brings to two and three-quarter billions the total amount spent by steel companies over the past 12 years in their programs to expand and improve their plants. From 1936 through 1946 such annual expenditures averaged more than $200 million per year.

The expenditures are required to provide the modern equipment, methods and processes for efficient, low-cost manufacture and distribution of products, of a character and quality to meet changing customer requirements. At the same time much of the new equipment will help increase the output of workers and will improve working conditions and safety. The expenditures in 1947 will cover a wide range of different types of equipment. However, a large portion of the 1947 expenditures will be for expansion of the industry's capacity for sheet and strip steel, products which have been in strong demand for peacetime purposes.

SAFETY AWARD: On behalf of employees of the L. S. Starrett Co., Athol, Mass., Arthur H. Starrett, company president, accepts a special accident prevention flag, an award for a three-year safety record. Operating under peak production conditions when a record number of employees were exposed to accidents, the company succeeded in holding its accident rate 76 per cent below the average for the tool manufacturing industry

Transfer of Ownership of Harris Foundry Announced

Acquisition by Russell C. Harris and associates of the interest in Harris Foundry & Machine Co., Cordele, Ga., owned by Mr. Harris' brother, Tom Ray Harris, recently was announced. In the transaction Tom Ray Harris took over his brother's interest in the R & T Lumber & Supply Co., also of Cordele.

Accompanying the transfer of interests from the two companies was the change in the presidency of each company, with Russell C. Harris becoming president of the foundry organization, and Tom Ray Harris assuming the presidency of the lumber firm. Russell C. Harris becomes the fourth member of the family to head Harris Foundry & Machine, a company which is an outgrowth of Tomlin-Harris Machine Co., one of Cordele's pioneer industries having been founded in 1889.

The Harris company, producer of hydraulic presses and farm equipment, has named Paul Barton vice president and works manager and Roy Simmons vice president and sales manager. R. L. Barfield and Fred H. Cutts continue as treasurer and secretary, respectively.

WAA Approves Discount Plan for Surplus Tools Intended for Resale

A 12½ PER CENT discount on surplus standard general purpose machine tools has been granted by War Assets Administration to machine tool rebuilders, manufacturers, exporters, dealers or other distributors who purchase for resale. The discount, included in revision of WAA Regulation 21, applies to those machine tools listed in WAA's fixed price catalog.

Previously approved by the Metalworking Machinery & Equipment Industry Advisory Committee, the discount is expected to promote the export of surplus machine tools and accelerate disposals in the domestic market. It is expected also to encourage rebuilders and manufacturers of machine tools to purchase for their own account for rebuilding and resale. The discount will serve to compensate for the cost of performing the distributive function.

Priority buyers who are entitled to purchase at the lowest price level will be entitled therefore to the 12½ per cent discount now allowed on these machine tools.

Existing WAA "approved dealer" program is not modified by this new sales policy. Those approved dealers making sales to users will continue to receive a 12½ per cent commission for their services. However, if an approved dealer purchases surplus machine tools for his own account for resale, he will get the 12½ per cent discount and no commission.

During 1946 more than $456 million (original cost) of surplus machine tools were sold by WAA.

Vider Use of Forgings Noted

Postwar models of automotive, transportation, construction, road building equipment and machine tools contain more forged parts than prewar, convention told

INDUSTRY is increasing its use of ged parts, C. E. Stone, president, In- state Drop Forging Co., Milwaukee, d chairman of the technical committee the Drop Forging Association, declared ently in New York.

Automotive, transportation, construc- n, road building and machine tool nufacturers, among others, are com- ing more forged parts in postwar dels of new equipment, he declared.

Backlogs of drop forgers now average eral months production. Some plants quoting deliveries of four to six nths although some improvement in pments has been made recently. Forg- plants are operating on two-shift edules in many instances, Mr. Stone closed.

He reported some improvement in sup- es of steel bars and billets over re- t months, although the situation is l tight.

These comments were supported by er members of the Drop Forging Asso- tion, who gathered at the Hotel Com- dore, New York, Feb. 14-15, for the i-yearly meeting of the industry. Ap- oximately 120 were present, with R. J. ern, president of the association and o head of Billings & Spencer, Hartford, nn., presiding. The technical com- ttee held a pre-convention meeting b. 13, with Mr. Stone presiding.

Use of Forged Parts Doubled

Material handling equipment makers said to have about doubled the num- r of forged parts used in their lines. ol builders have increased their re- irements of steel forgings, especially oil well drilling tools, slush pump lves and pistons under hard service.

Address by Brig. Gen. Donald Arm- ong, American Standards Association, tured a session on standardization portunities. The speaker stressed the ed for greater simplification of steel ecifications and urged forgers to exert eir influence to this end. He was con- lent it would redound to their advant- e as well as to steel producers, and, the long run, to the consumers them- ves.

Various other phases of the forging siness came up for discussion, includ- production, engineering and market- activities. Much interest was directed the industry's research program which being conducted under the direction John M. Lessells, of Lessells & Asso- tes, Boston, and a member of the faculty of Massachusetts Institute of Tech- nology.

This program includes studies in mech- anical and metallurgical properties of closed impression die forgings, and of mechanical and metallurgical properties of other engineering materials and a com- pilation of comparative data obtained on properties of forged and cast materials.

Special investigations also are included, such as relative forgability of materials used by the drop forging industry and the size of equipment required for a particu- lar forging; effect of surface conditions on fatigue strength including decarburi- zation, scale, seams, laps, etc.; the import- ance of flow lines; comparison of sound- ness in metal products; and effect of size on the fatigue strength. Compilation of basic data for the design of closed im- pression die forgings also is under de- velopment.

In addition to forging procedure from the specification and examination of raw stock through to the production of the finished product and equipment perfor- mance, working conditions, special heat treating studies and factors influencing design also came in for special discussion. Need for educating designers to make full use of advantages offered by the forg- ing industry was stressed.

Steel Founders Hold 45th Annual Meeting

A wide range of problems affecting the steel casting industry came under review at the forty-fifth annual meeting of the Steel Founders' Society of America at the Edgewater Beach Hotel, Chicago, Feb. 12 and 13.

Among factors stressed as needing con- tinuing attention were research and tech- nical projects, increased attention to good housekeeping and greater mechanization of operations, training of foundry engi- neers and workers and evaluation of per- sonnel, better customer and public rela- tions, better cost accounting, safety and greater technical control and greater use of foundry knowledge already available.

The society now has 11 research proj- ects under way and reports on six of these will be published this year.

E. D. Flinterman, president of the so- ciety and of the Michigan Steel Castings Co., Detroit, awarded plaques for out- standing service to the steel castings in- dustry and public service during the war to the members of the Office of Price Administration Advisory Committee of the Steel Castings Industry.

J. A. Sauer, Symington-Gould Corp., Rochester, N. Y., was awarded the Fred- erick A. Lorenz Medal for his contribu- tion to the general welfare of the in- dustry. For outstanding contributions to the technical and operating work of the industry, Walter F. Wright, Sawbrook Steel Castings Co., Cincinnati, was award- ed the Technical and Operating Medal of the society.

Steel Products Warehouse Association Dissolved

Steel Products Warehouse Association Inc., Cleveland, has been dissolved, of- ficers announced last week. The associa- tion was organized in 1942 by a group of warehouses primarily concerned with the distribution of secondary steel prod- ucts.

Basis for the present action was said by Clayton Grandy, retiring president and executive-secretary, to stem from pro- gressive changes in mill practices affect- ing flat-rolled products, and in member interests to fields already effectively served by other long established organi- zations, such as the American Steel Ware- house Association.

Meetings of the several chapters of the association in Chicago, Detroit, Cleveland and Youngstown are scheduled to honor its retiring national and regional officers.

Corrosion Engineers Plan Conference and Exhibition

Tentative program for the annual conference and exhibition of the Na- tional Association of Corrosion Engineers, to be held in the Palmer House, Chi- cago, Apr. 7-10, has been drawn up. Eight technical sessions and 32 technical papers will be presented during the con- ference. The symposiums have been divided into the following classifications: Water industry; chemical industry; elec- trical industry; gas industry; communica- tions; oil industry; general industry; and cathodic protection.

Wednesday evening, Apr. 9, the annual NACE banquet will be held, with President F. J. McElhatton pre- siding. Introduction of new officers will be made at that time.

Meeting of Wire Producers Held Recently in Pittsburgh

The Fine and Specialty Wire Manu- facturers' Association held a meeting in Pittsburgh, Feb. 13-14. Papers presented included "Fundamental Phenomena of Dehumidification" by John Carroll, Davison Chemical Corp., Baltimore. The society has sixteen member companies.

Windows of Washington

By E. C. KREUTZBERG — *Washington Editor, STEEL*

Suspense characterizes life of many government employees as Republican congressmen talk of slashing budget and cutting federal payrolls. Reductions probably will be large but not as wholesale as indicated by newspaper headlines

LIFE for government employees is characterized by suspense. Hardly a day goes by without reminders that the economy-minded Republicans are in the saddle and that there is far less security in government employment than under the New Deal.

Two or three times a week Chairman John Taber (Rep., N. Y.) of the House Appropriations Committee or some other influential Republican has been making the headlines with threats to reduce the number of government employees "by 1,000,000." On alternate days someone like Sen. William Langer (Rep., N. D.) condemns such statements, and points out that they "arouse needless fears." At the same time, Senator Langer has been talking about such projects as driving the Democrats out of the Post Office Department and replacing them with Republicans. Then there are other headlines, as "400 To Get Bad News Tomorrow at OHE," and "1874 Face Starvation in D. C."

These uncertainties keep throwing a scare into many rank and file government employees, but they are especially disconcerting to agency heads whose activities are under challenge in the economy drive and who therefore are unable to plan their future policies.

No one in a responsible position in Washington expects a reduction in government employment of 1,000,000—or anything like it. What creates the feeling of suspense is the lack of information as to where the proposed cuts will be made.

The program of the Republican-dominated Legislative Budget Committee to effect a $6 billion reduction in President Truman's budget—from $37,528 million to $31.5 billion—is generally regarded even by the Republican leaders as representing only a starting figure.

BUDGETEERS: Members of the congressional budget committee meet to take action on a subcommittee proposal to cut the budget to $31.5 billion. Shown are, left to right: Rep. John Taber (Rep., N. Y.), chairman of the House Appropriations Committee; Sen. Styles Bridges (Rep., N. H.), chairman of the Senate Appropriations Committee; Rep. Harold Knutson (Rep., Minn.), chairman of the House Ways & Means Committee; and Sen. Eugene Millikin (Rep., Colo.), chairman of the Senate Finance Committee. NEA photo

The prevailing attitude is pretty well reflected by Rep. Everett M. Dirksen (Rep., Ill.) who says that "if we have to save money, the thing to do is save it. There are all sorts of reasons why expenses should not be cut—and too many people still are looking for a painless economy. There is no such animal."

Indications are that a good many agencies which have outlived their usefulness or which cannot give a good account of themselves will be cut off. A good example is Interior's Office of Indian Affairs. Numerous Commerce Department activities are to be singled out for curtailment or elimination. The principal battle will involve the appropriations for the armed services. War, Navy and Air Forces have plenty of arguments to use in backing up their requests, and, statements of Republican leaders notwithstanding, majority sentiment in Congress appears to favor cuts in directions other than the armed forces.

Whatever action Congress takes on appropriations for the next fiscal year, uncertainty as to where effects of the economy drive will strike will continue to hang over government departments and agencies until substantially June 30. It will require a heavy work schedule on the part of the congressmen and committees involved to organize the fiscal program by that date.

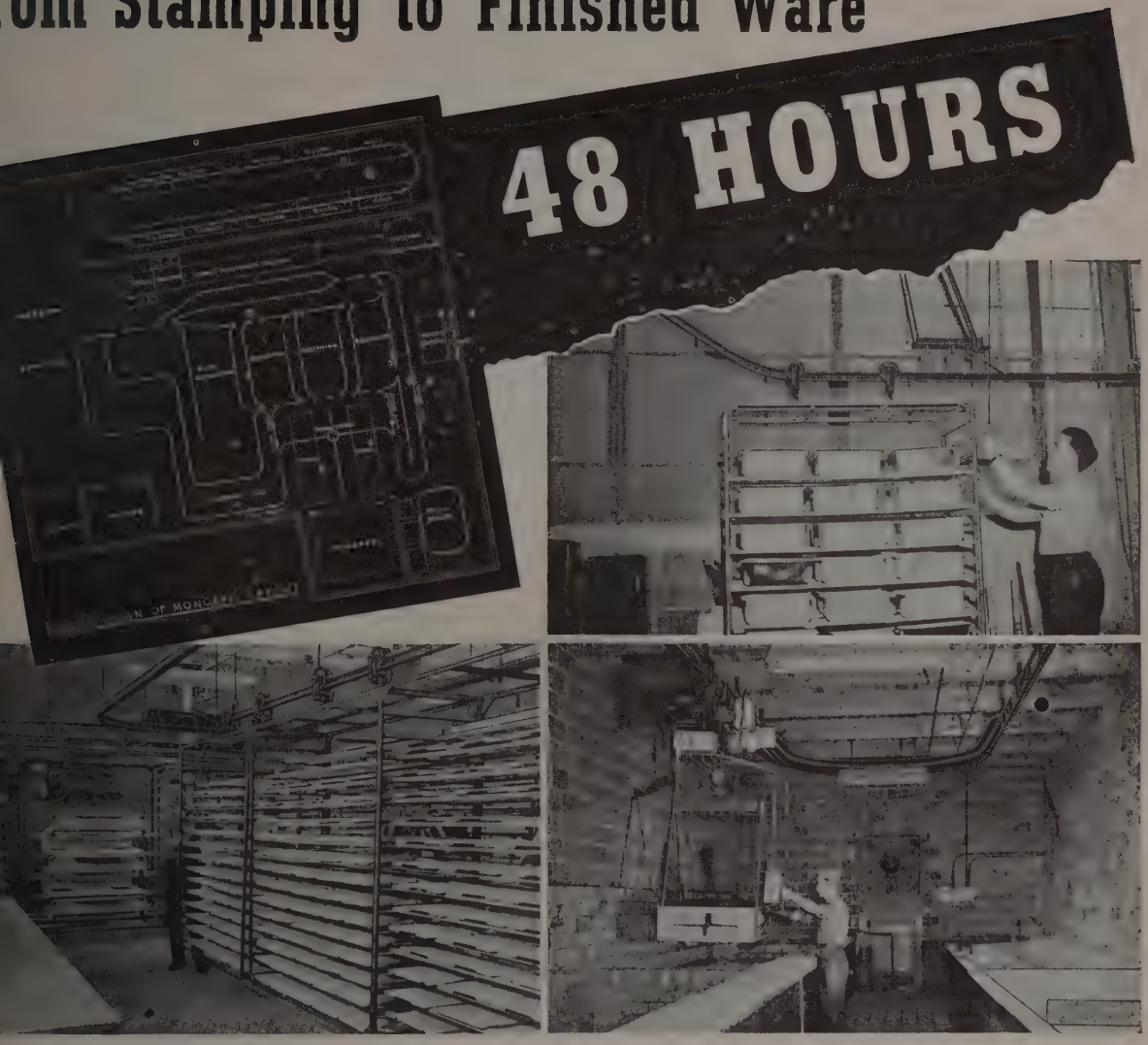
Where Are New Dealers?

Senate fight over confirmation of David E. Lilienthal as chairman of the Atomic Energy Commission is the subject of much conversation in Washington. Aptly enough, it frequently raises the question: What has happened to the New Dealers? Where are the thousands of attorneys, economists, administrative assistants and specialists of one kind and another who came to the capital during the Roosevelt administration to assist in the great effort to revive prosperity by redistributing the wealth?

Many former New Dealers have left government service and returned to private employment. Many have abandoned their ideological leanings as far as outward appearances go. Many other former New Dealers continue in the government, and some of them hold positions of great influence, as on the Supreme Court, and in numerous government departments and agencies. There is a general impression that these men, too, have altered their former New Deal beliefs.

However, there continues on the government payroll a big representation of unreconstructed New Dealers who have gone underground. These people hold the same ideas as ever about soaking the rich.

rom Stamping to Finished Ware



(Finishfotos—Courtesy Dana Chase Publications)

Compactness and a steady flow of material were considered essential in this porcelain enamel ware and parts plant. The American MonoRail system over which all ware is handled, is compact, avoids bottlenecks and assures 48 hours turnover from raw stamping to finished ware.

American MonoRail equipment serves each operation. Flexible arrangement permits continuous and prompt flow of ware through all departments. An unusual feature is shown in top photo where a simple air device lifts racks from one level to another, permitting easier loading and unloading. In this plant, like hundreds of others, American MonoRail equipment tends to integrate entire operations.

An American MonoRail Engineer may be able to show you how to speed up your operations with no sacrifice to quality and with marked savings. We invite your inquiry.

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A 56-page book showing successful applications of American MonoRail Systems.

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taking away from the haves to give to the have-nots, etc. Many of them have had job trouble in recent months; some have been let out, while others worked for agencies that recently have been terminated. But in a surprising number of cases, despite the trend toward a reduction in the number of federal employees, they have been able through their friends to land in other government jobs. To many of these people—they include both men and women—the best thing that could happen would be a big depression to cause another wave of discontent in this country, and thus create a new opportunity to bring to a satisfactory conclusion the reform movement of the 30s.

Last Allocation Plan

The setting up of a voluntary agreement under which the steel industry will earmark 165,000 net tons of steel monthly, of which 120,000 tons will go to construction of 7000 freight cars a month, and 45,000 tons will be made available for rehabilitation of cars needing repairs, probably will be the final program of this type to be set up during the remainder of the reconversion period. CPA officials arranged this program under protest, saying that the railroads would be able to get needed cars without such special action. One of the bad features about the program is that it has caused automobile and other manufacturers to protest at this action to favor the railroads.

Map Procurement Program

As a result of unremitting efforts by three leading figures in the wartime War Production Board—Donald M. Nelson, J. D. Small and Secretary Julius Krug—the Bureau of the Budget has reported to the White House its recommendation for the type of organization to have charge of industrial mobilization in another war. The organization is to consist of civilians to whom the claimant agencies will tell their stories and advance their claims.

If the present plan is carried out, President Truman soon will issue an executive order which will give the Civilian Production Administration a new name and provide for its maintenance as a permanent government agency. All key positions will be filled by representatives from the industries required to support war production and essential requirements of the civilian population. The plan has been reported to the House Armed Services Mobilization Subcommittee and the latter is expected to prepare legislation under which the agency will function permanently.

Other House Armed Services subcommittees are working diligently on tasks to make for smooth procurement during a future war. The Procurement Subcommittee has approved a bill giving the armed services authority to procure many items by negotiated contracts instead of by the old competitive bidding method. The subcommittee also has approved a bill which would encourage joint procurement policies of the three armed services.

Wendell Berge, head of the Department of Justice Antitrust Division, will resign May 1 and return to private law practice. NEA photo

FTC Summarizes Policies

Satisfaction over its new trade practice conference policy is indicated by the Federal Trade Commission in its recently published annual report.

Under the old policy a company might be investigated as a result of a complaint, and prohibited from following certain unfair trade practices, but competitors of that company were left free to follow the same unfair practices until such time as the commission took action against them.

Under the new policy, which became effective last year, the commission initiates industry-wide investigations and takes "uniform corrective actions on an industry-wide basis." Where there is evidence of unfair trade practices in an industry, all members of that industry are investigated and those utilizing unfair methods of competition are proceeded against simultaneously.

So far, since the change, trade practice rules have been approved for four industries. These are the artificial limb, construction equipment, piston ring and wholesale confectionery industries. Rules are under development for a number of other industries, including the watch case, and saw blade service industries.

"The rules for the artificial limb industry," says the report, "were of material aid to a federal court in disposing of an antitrust case in which 71 members of the industry were found guilty of violating the Sherman Act and were assessed fines ranging from $200 to $1500 each. These fines were suspended in part, and the defendants placed on a year's probation and made subject to the court's special condition that they 'conform' to the trade practice rules promulgated by the Federal Trade Commission on April 16, 1946.

"The judgment and order of probation," the report continues, "constitute judicial action or recognition of special significance in support of the value of the trade practice conference work as an industry-wide means of curbing the growth of monopolistic and unfair competitive methods of business."

Batt Leaves Washington

Departure from Washington of William L. Batt on Feb. 14 marked the end of a 6½-year period of government service in which he filled some of the top posts in industrial mobilization before, during and after the war.

Back in 1940 he became division executive in charge of mining and mineral projects of the National Defense Advisory Commission under Edward R. Stettinius, Jr. Later that year he was appointed deputy commissioner in charge of industrial materials. In 1941 he was a member of the President's special mission to Moscow. When the War Production Board was organized he was assigned so many duties that by the spring of 1942 he had more assignments than he could "decently" handle, as he put it. He resigned certain posts, including that of director of the WPB Raw Materials Division. He continued as chairman of the vital WPB Requirements Committee, and co-ordinated our requirements with those of Canada, the United Kingdom and Russia in drawing from the common materials pool. In 1943 Mr. Batt became vice chairman of the War Production Board, and continued to fill this post until after V-J Day.

At White House request, Mr. Batt continued to serve during the reconversion period, being appointed in September of 1945 to the chairmanship of the Inter-Agency Policy Committee on Rubber. At Mr. Batt's suggestion, this committee now has been terminated and its remaining work will be carried on by John R. Steelman in the latter's capacity of assistant to the President.

Mr. Batt now is back, on a full-time basis, at his job as president of SKF Industries Inc., Philadelphia.

Scope and Character of New Labor Laws Crystallizing in Congress

Legislation curbing union powers and granting employers equality in bargaining process expected to be enacted in March. Outline of statutory changes taking form in testimony and recommendations before Senate and House labor committees

CONGRESSIONAL opinion as to the character and scope of needed labor legislation is crystallizing under impact of the daily barrage of testimony and recommendations offered in hearings of the Senate and House labor committees. Outlines of the anticipated statutory changes are more clearly discernible. Indications are the net effect will be to curb the power of labor unions and to put employers in position of equality in the collective bargaining process.

There never has been any doubt about prospects in the House; strong legislation will get a big majority there. From the start it has been apparent the degree to which the 80th Congress would provide labor law reforms depends on the Senate —and more particularly the Senate Committee on Labor & Public Welfare.

"Liberal" members of this committee of late have shown a disposition to soften up; some definitely have switched their positions and have openly signified their approval of steps opposed by the unions.

Nation-Wide Bargaining Hit

For example, Sen. Wayne Morse (Rep., Oreg.), who has turned out to be perhaps the leading influence in the Senate committee, surprised all observers by acquiescing with the proposal that steel fabricating companies who do not manufacture any steel themselves should not be stalled off and later forced to accept the same terms which the United Steelworkers-CIO has reached in its negotiations with the steel producing industry. Senator Morse's reaction to the testimony of representatives of the Non-Basic Steel Co-ordinating Committee was taken to indicate his support for the proposition that unions must be forced, when necessary, to bargain with each employer separately, on local and competitive industry basis, rather than be allowed to impose an arbitrary national wage pattern.

Spokesmen for the fabricators were E. C. Evans Jr., president, Evans Products Co., Detroit, and chairman of the committee; Nelson M. Graves, president, Barcalo Mfg. Co., Buffalo; C. J. Glasgow, president, C. J. Glasgow Co., Detroit; William J. Sampson Jr., president, American Welding & Mfg. Co., Warren, O.; T. Foster, vice president, Foster Bros. Mfg. Co., Utica, N. Y.; F. H. Klein, president, Orr & Sembower Inc., Reading, Pa.; and A. V. Murray, president, the Scaife Co., Pittsburgh.

They pointed out that 1100 steel-using companies, employing 350,000 people, were shut down last year pending solution to the basic steel case which was terminated when President Truman plumped for 18½ cents an hour increase. Thereupon the fabricators were forced to settle for the same increase—"or else."

Whereas the steel companies had been given assurance that their appeal for higher prices based on the increased labor costs would have favorable consideration, the fabricators were given no such comfort. They were forced to give the 18½ cent wage increase and pay higher prices for their steel—and without any compensating increase in their sales prices. Even had they received permission to charge higher prices, however, they still would have been in a difficult position, for most of them had competitors who had no contracts with the United Steelworkers.

This, Mr. Evans said, was "collective bludgeoning," not "collective bargaining." He and his fellow spokesmen asked that Congress adopt legislation defining collective bargaining and imposing equal responsibilities on the bargaining parties, so that employers would have "the right to have their local and competitive problems considered in the course of bargaining proceedings."

Mr. Evans made it clear that as the Wagner Act now stands, the unions are free even to defy the President of the United States. In March, 1946, the President announced that the 18½ cent increase was intended to be applied only to "basic steel," and he recommended that the strikes of the non-steel producing fabricators be settled "by negotiation." Thereupon Philip Murray, president of the steelworkers' union, charged the President with "committing a serious disservice to industrial peace," and he refused to negotiate. When the fabricators tried to get help from the Conciliation Service and other government agencies, the reply in all cases was the same; the government had no power to enforce the President's recommendations.

Another witness who disturbed the committee was Earl F. Reed, counsel for the Weirton Steel Co., who accused the National Labor Relations Board of seeking "in every way to wipe out" the independent union of Weirton workers. The board, he declared, had installed its own representatives "in the CIO union headquarters to coach paid CIO organizers as to the methods they should use to get on the (Weirton) payroll." He said that "board representatives attended secret conferences at which CIO leaders paid bribes to officers of the independent union to induce them to betray it by going over to the CIO." The board showed hostility in various ways, said Mr. Reed, as by refusing to hold an election at Weirton where the independent union represents about 90 per cent of the workers.

Reception of such testimony by these and other witnesses has given ground for the belief that the remedial legislation which is to materialize soon—probably in March—most certainly will provide that the bargaining agencies recognized will be those chosen by the employees in each case, and that the union will be compelled to bargain in good faith with the employer in each case.

Chances for compulsory arbitration appear to have faded out of the picture. First, it has been shown by witness after witness that arbitrators' awards can be, and are, enforced against the employer, but cannot be enforced against the union. It was shown time and again that there are certain issues which neither side would submit to arbitration without protest. The unions cannot be expected to consent to arbitration when the decision might imperil their existence. And the employers cannot be expected to consent to arbitration when an adverse decision might destroy an essential management function.

Union Control of Jobs Attacked

As an example of the testimony regarding arbitration, it was pointed out that baneful results had ensued to the shipping industry from a decision of the National Longshoremen's Board which was appointed to arbitrate the coastwise shipping tieup of 1934. The longshoremen were awarded the hiring hall and, according to the witness, Almon E. Roth, president, National Federation of American Shipping, they ever since have been using this hiring hall "to destroy any loyalty between employer and employee and to give the union complete control of the individual longshoreman's job. Through this control, the union has carried on a systematic program for curtailment of production which has resulted in greatly increased operating costs and costly work stoppages. In view of this experience, the waterfront employers in 1939 refused to arbitrate a demand for a hiring hall and rotational employment for supervisory clerks, and they had to withstand a 59-

day tieup of the port of San Francisco before the union abandoned this demand."

On the other hand, a strong case was made for the value of arbitration when it is voluntary. The dividing line, as several senators outlined their understanding of the issue, is this: No arbitrator should have the power to write contract provisions. The arbitrator's range of usefulness lies in interpreting the applicability of existing contract provisions and in settling the grievances that arise in the administration thereof.

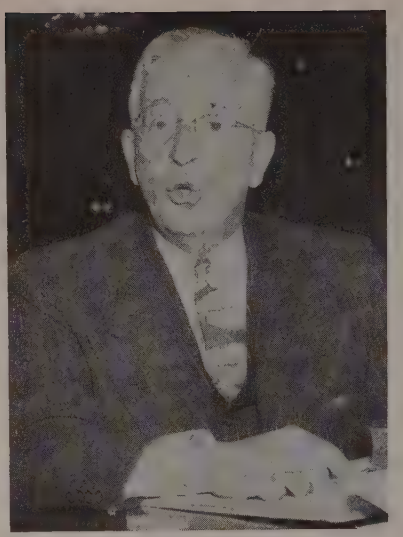
Another legislative proposal likely to materialize is elimination of the United States Conciliation Service from the Labor Department. A vast amount of testimony has been presented in proof of the contention that conciliators cannot function fairly to both sides when attached to a department which, by statute, is charged with the duty of promoting the welfare of labor. Essentially the testimony of numerous witnesses boiled down to this: The procedure commonly followed is for the conciliator to ascertain what the union wants, and then exert pressure on the employer to accede to union demands.

Another proposal with wide support is the one that would exclude supervisory employees from the definition of the term "employee" in the Wagner Act. Many witnesses told of cases where foremen have been forced to join unions of the rank-and-file workers under threat of being "run out of the plant." In such cases it is only natural that the foremen should try to get along with the union and that loyalty to the employer loses out.

Upholds Unionization of Foremen

On the other hand, there is considerable sentiment in favor of allowing foremen to join for collective bargaining purposes—provided they have their own independent unions. The Senate committee staff is studying the wording of a provision to cover this point and make it clear as to just what workers the term "supervisory employees" should cover. Present indications are that watchmen, confidential office workers, and other employees who have access to information which the rank-and-file union could use to advantage in collective bargaining with the employers will be placed in this category.

A notable development in the Senate committee hearings has been the steady loss in prestige of the once-sacred Norris-LaGuardia anti-injunction act. This change has come about as a result of a vast amount of testimony about the use of the boycott and sympathetic strike to compel union recognition. Witnesses have told time and again about instances where third parties have suffered, and the public has suffered, from boycotts and strikes and that there is no present legal power



Harold W. Story, vice president, Allis-Chalmers Mfg. Co., Milwaukee, tells the Senate Labor Committee that "fifth column" union leaders are seeking to advance communism under the mantle of trade unionism at his plant. Story urged new labor legislation to weed out communistic leadership from unions. NEA photo

to protect these innocent people. By putting a picket line in front of a third party's plant, for example, union agents force hundreds of employers throughout the country to obey their demands without respect to their merit or legality.

As one of many examples, senators were informed that at that very moment the entire rural community of Rio Vista, Calif., was being deprived of essential food and supplies because the AFL teamsters' union had declared the town to be "hot." The people in Rio Vista, who do not know what the trouble is about, simply know that their usual sources of food and other commodities have been closed off.

Just how far the Senate committee will vote to go in revising the Norris-LaGuardia Act is not yet apparent but it is expected an effort will be made to prevent shutdowns of key industries and to prevent "quickies" and other illegal strikes. What numerous witnesses asked for is "the right of the employer to go to the federal courts for money damages and injunctions."

On whether or not to ban the closed shop the issue is not yet clear. Senator Morse, whose thinking on this point is highly influential with the rest of the committee, has said outright that he personally is opposed to the closed shop. He thinks that it would be a rather simple matter to revise the Wagner Act and set up machinery to protect a man who did not wish to join a union, but it would be something else again to prevent unions from employing intimidation and coercion. "You cannot legislate union responsibility merely by banning the closed shop," he has said on several occasions.

But there are some other confusing factors. Several of the senators have pointed out that thousands of employers have closed shop contracts and insist on maintaining the closed shop arrangement. These same senators also doubt whether a closed shop ban would be held as constitutional.

"I just can't hear the Supreme Court saying that outlawing the closed shop conforms to the freedom of contract," remarked Senator Morse. "I don't think it safe to pass legislation that has such constitutional dangers."

Another important point on which there is doubt is Senator Ball's proposed ban on industry-wide bargaining. Several senators feel that the answer lies not in such a ban but, rather, in giving the employer equal rights under the Wagner Act. That is, the Wagner Act should be amended so that the employer may have recourse to the National Labor Relations Board when the union refuses to bargain with him in a fair manner. These senators point out that the railroad industry engages in industry-wide bargaining; they hold industry-wide bargaining is of stabilizing value when the union or unions involved accept responsibility. Hence, they feel, the requirement is to force unions to live up to their responsibilities in good faith.

Communistic Influences Cited

Harold W. Story, vice president, Allis-Chalmers Mfg. Co., Milwaukee, produced a sheaf of exhibits to prove communistic leadership of the union responsible for his company's long-continued strike. Mr. Story explained that communistic labor leaders survive by releasing false propaganda; he recommended that the Wagner Act be amended to make "publication in writing or by radio of untruthful statements by a union or employer an unfair labor practice." He endorsed a secret strike ballot, a ban on the closed shop, and protection of a man's right to work even where picket lines are used. He also asked for "governmental intervention to provide democratic procedures in unions," to the end that "disenfranchised groups within the unions" may enjoy their rights. With such amendments, he said, "a great step forward will have been taken to eradicate the weed of communistic control of unions without harming the growth of sound trade unionism." Allis-Chalmers strike trouble did not start, he concluded, until 1937 when communists came into control of Local 248 of UAW-CIO.

The Truman-approved "industry-wide"

greement in the construction industry vas the subject of a word of caution to he committee by S. M. Cooper, executive ice president, Fafnir Bearing Co., New Britain, Conn. Such agreements, he varned, "could well be more dangerous han the strikes themselves." Sound bargaining, he held, must be on a local or ompany basis.

Another spokesman for the employers vas Ira Mosher, chairman of the executive committee of the National Association of Manufacturers, who repeated to he senators the proposals of the NAM or amending the Wagner Act. If Congress will remove the "external obstacles o good relations between management nd its employees," he said, "I predict ou will see an era of labor peace previously unknown. The interests of labor nd management will be fully protected, nd the public will have the benefit of oth efficient production and industrial eace." Mr. Mosher's presentation ran to early 21,000 words—much the longest ubmitted to the senators. The obstacles o be removed, he said, are as follows:

1—Intervention by government, whether by compulsory arbitration, permanent ediation boards or politically-directed act-finding;

2—Industrywide bargaining and secndary boycotts;

3—Union objectives which conflict with mployees' best interests and which result n strikes having nothing to do with vages, hours or working conditions;

4—One-sided obligations and responsiilities under existing laws.

Plan Huge Modernization Program For Wales Sheet, Tin Plate Industry

Several leading companies to co-operate in building hot strip mill at Port Talbot and cold reduction mills at Llanelly and Swansea. Program described as largest in scope and expenditure ever undertaken by British industry

BIRMINGHAM, ENG.

A NEW 50 million pound sterling ($200 million) concern, the Steel Co. of Wales, is to be formed to carry out a vast plan for modernization and development of the South Wales sheet and tin plate industry. Leading firms have agreed to co-operate in the erection of a new hot strip plant at Port Talbot and cold reduction mills in Llanelly and Swansea. A third cold mill will be at Newport or Port Talbot. These proposals are described by the companies as the largest in scope and expenditure ever undertaken by the industry. If everything goes well, the new plants, the building of which will provide employment for thousands of workers in what was formerly known as depressed areas, will be in full production in four to four and a half years.

The new company will take over most of the old-type tin plate works owned by Richard Thomas & Baldwins, and Llanelly Associated Tin Plate companies and the sheet works at Newport of John Lysaght Ltd. so that production arrangements can be fully co-ordinated and the problems of obsolescence tackled with a minimum of dislocation and hardship when the new plants come into operation. The Port Talbot and Margam Works owned by Guest, Keen Baldwins Iron & Steel Co. Ltd. will also be acquired by the proposed new company and incorporated in the development scheme, to form the basis of the hot strip mill.

It is estimated that when the new mills are in full production, the output of the Port Talbot and Margam coke ovens and blast furnaces will be doubled, and the ingot production trebled. The hot strip mill will have an output of 20,000 tons a week.

Steel Famine To Follow Britain's Fuel Crisis

Not since 1926, the year of the general strike, has British industry suffered such paralysis as is now being experienced through the cutting off of electric power throughout the country. Weather conditions are worse than they have been for 50 years and until the arrival of milder days the fuel position will remain dangerously critical. Effect on the iron, steel and metalworking industry has been to shut down works in all sections. Even before the power cut became widespread coal consumers had not been receiving their full allocations, partly through reduced output at the collieries and even more because of the shortage of railroad cars.

To a great extent, the steel industry is dependent on coal, coke and electricity though in recent months conversion to oil firing has been taking place and will probably be pushed ahead. Should the situation improve, manufacturers of steel would probably be able to satisfy the immediate needs of consumers from material produced before the big switch-off came into effect. But it will be during the next few months that the results will be felt most severely. When the wheels of industry begin to turn normally —which may not be for another two or three weeks—there will be a steel famine.

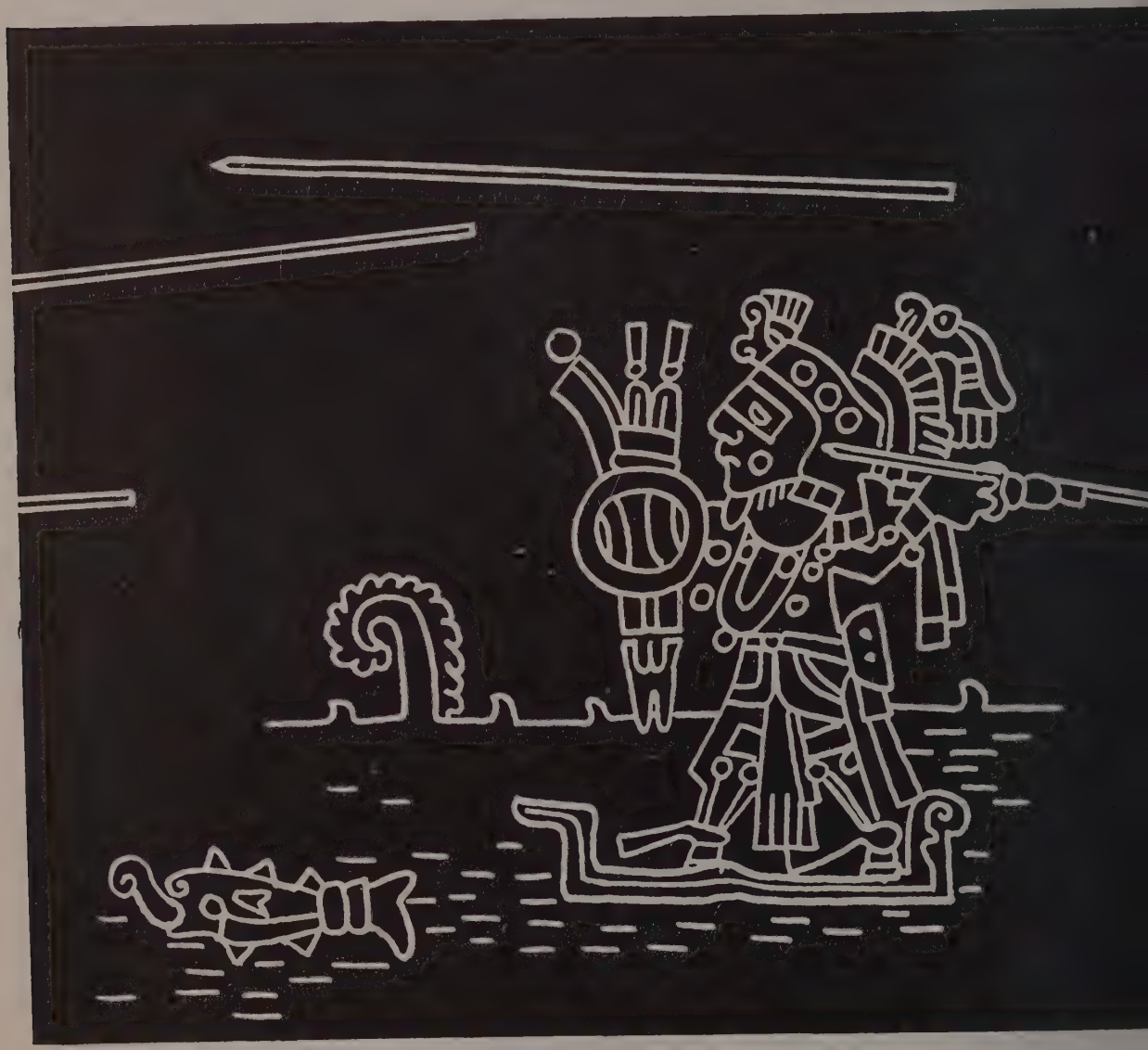
It is estimated that about a million workers are idle.

ROYAL VISITOR: A royal visitor to the Gary, Ind., works of Carnegie-Illinois Steel Corp., recently was His Royal Highness, Prince Saud Al-Saud, center, of Saudi Arabia, who is shown in the rail mill. At left is S. M. Jenks, superintendent of the works. The prince is making a transcontinental tour of the United States. NEA Photo

HOW TO MAKE AN ARM GROW

A human arm can throw a spear only so far. But some ancient genius of an engineer figured out that, by employing a throwing stick, which the Aztecs called *atlatl*, the lever of the human arm —and the distance achieved—could be extended, with quite pointed results for an enemy.

Specifying molybdenum in steel is something like using an *atlatl*. For molybdenum extends the usefulness of good steel. By providing good hardenability at low cost, molybdenum steels permit modern engineers to save weight—and costs—in design. It pays to specify molybdenum.



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y A. H. ALLEN Detroit Editor, STEEL

Mirrors of Motordom

Auto manufacturers group warns increasing shortage of pig iron will cut industrial production and employment. Immediate termination of allocation and priority controls, now channelling large amounts to soil pipe production, recommended

DETROIT

RENEWED warnings of the increasngly serious shortage of pig iron and s effects on automotive foundry output ere forwarded officially last week by eorge W. Mason, president of the utomobile Manufacturers Association, Maj. Gen. Phillip B. Fleming, admintrator of the Office of Temporary Conols. In a letter, Mason said: "Based n best information from the foundries upplying automotive assembly plants nd parts suppliers, the curtailment will ot be momentary but, on present prosects, will run through the second quarr of 1947."

Continuing, he noted the cutbacks will not be from a full production level, ut from the restricted basis of operaons (75 per cent, approximately—ed.) ow prevailing in the industry.

"All the evidence we have is that the ey to the pig iron shortage is the alocations to housing purposes, which eem to exceed present realistic hous-ng completion schedules. We are fully ware of other conditions limiting pig on supply, and it is because of these at we maintain it is absolutely necesry to avoid tying up valuable tonnage here it will not be put to immediate se.

Free Market Urged

"We remain of the opinion that govrnment allocation and priority controls f this type should be terminated imediately. A free market will most uickly accomplish an equitable and roductive distribution of available maerials, and the government should make his possible without delay. Failing to o so, it should face the fact it is carryng the responsibility for curtailing emloyment and output of needed goods."

A similar protest registered by the .M.A. when the lead shortage had beome acute brought prompt action by he government to alleviate the trouble, o it may be reasonable to expect action y the OTC in throwing out allocation f pig iron to housing on the present asis. One foreseeable difficulty, howver, is that these allocations are backed y government subsidies to high-cost last furnaces supplying iron for the ederal housing agency's soil pipe proram. Funds for the subsidy come directly from the housing agency and should allocations be scrapped the subsidies likewise would go, raising the question of whether the blast furnaces involved could continue operations without raising prices substantially.

There is little question among industry observers that far too much iron has been channelled by directives to soil pipe. Builders report this pipe tonnage will be "sticking out the country's ears" for years to come.

The "other conditions" referred to in the Mason letter center primarily on the close hold which integrated steel companies keep on their pig iron supply, so vitally needed in open-hearth furnaces for steel production, particularly in view of the scarcity and mounting price of scrap steel. Merchant blast furnaces cannot keep up with the feverish demand for iron, especially from the high-production gray iron melters, and the latter have been forced to unusual steps to locate iron tonnage. Imports from Mexico and foreign countries have helped to some extent but have added terrifically to costs. General Motors has contracted for about 10,000 tons of pig monthly from the Geneva Works in Utah, paying freight of something like $16 per ton on the material or nearly 50 per cent of the base price. Most of this iron goes to the Chevrolet gray iron foundry in Saginaw, although some is apportioned to other GM foundries.

Automobile Production

Passenger Cars and Trucks—U. S. and Canada

Estimates by Ward's Automotive Reports

	1947	1946
January	371,796*	126,082
February		84,109
March		140,738
April		248,108
May		247,620
June		216,637
July		331,000
August		359,111
September		342,969
October		410,510
November		380,664
December		380,908
12 ms.		3,268,456

** Preliminary.*

Estimates for week ended:

	1947	1946
Feb. 1	94,114	29,295
Feb. 8	89,958	23,785
Feb. 15	93,592	21,555
Feb. 22	94,000	19,410

Coke Shortage Is Problem

Two or three automotive foundries have attempted to moderate a coke shortage—which is just about as bad as the pig iron drouth—by admixtures of coal to their cupola fuel. Results have been mixed, some experiments with anthracite coal being chalked up as failures while at least one instance of the successful use of bituminous coal is reported. One plant is even giving consideration to injecting oil into the cupola air stream in the effort to cut down the coke ratio.

Serious lack of uniformity in quality of coke has resulted generally in foundries being compelled to use more coke proportionately than in normal operations, thereby further complicating their supply problem. And on top of that the percentage of scrapped castings has risen from 5 to 10 times normal on a tonnage basis, even more on a dollar basis. As if these problems were not enough, when the foundryman seeks to purchase a small tonnage of foundry scrap for his melt and bumps up against prices of $45 to $50 a ton, then he can perhaps be pardoned for occasionally chewing on molding sand.

There is nothing new about these shortages, substitutions and makeshifts, they are just being thrown into a little sharper focus currently—probably a good sign, for it is usually when the howling starts to get the loudest that relief is on the way. A number of automotive foundrymen are going to be sadly fooled if their pig iron, iron, coke and scrap problems have not all evaporated by fall.

Standard Parts Scarce

Another shortage which is becoming increasingly bothersome to automotive plants, particularly body manufacturing divisions, is in respect to standard parts —bolts, nuts, washers, screws, rivets, fasteners, and the like. These items are used in quantities running into the hundreds of millions annually and while the

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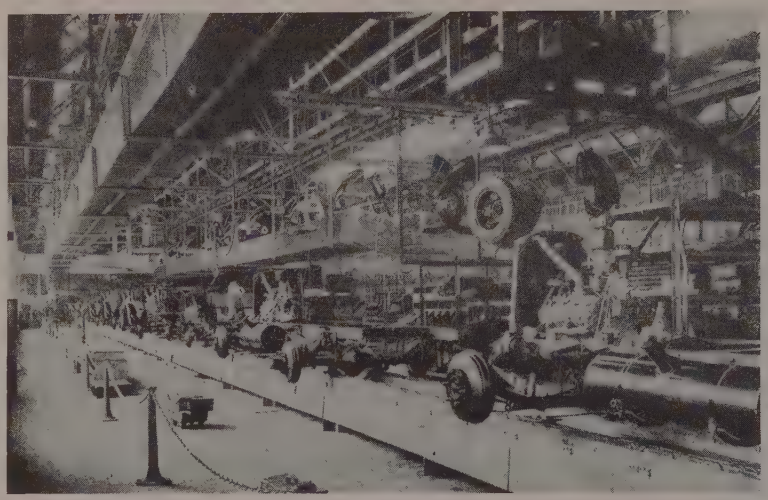


INDUSTRIAL PARALYSIS: One of England's industrial plants closed when severe winter weather brought a crisis in the country's fuel shortage was the Ford Motor Co. plant in Dagenham, Essex, an idle assembly section of which is shown above. Some 12,000 employees were thrown out of work temporarily at the plant. NEA photo

unit cost averages only 0.1 per cent of the selling price of the car, the steady movement of such parts to assembly lines is vital. Just last week it was reported one builder was in danger of having to ship cars without windshields because of a shortage of trim screws.

A dozen or so companies handle the bulk of standard parts shipments to the automotive industry and they are quoting deliveries now of six months to a year. Suppliers of course have been having their share of trouble keeping up with releases because of difficulties in obtaining steel, work stoppages such as the recent protracted tieups at Lamson & Sessions and Buffalo Bolt, and the general confusion resulting from muddled follow-up policies of large buyers.

Thus standard parts shortages are imminent if not already here. Top automotive management is not fully aware of the situation, probably feeling there are more serious worries than the supply of nuts and bolts to assembly lines. A rude awakening could be in store.

Contributing to shortages is a serious wastage of parts in use. Workmen scatter handfuls of small parts inside bodies in process, over plant floors and elsewhere with little thought to their value. An example was the recent experience at a truck manufacturing plant here, where supplies of a certain type of screw had been exhausted completely. Thorough sweeping of the floor resulted in accumulation of two days' supply of screws which kept the plant going until new shipments arrived. Hundreds of bodies come off assembly lines daily throughout the industry with quantities of "spare parts" carelessly lost inside door panels and in other inaccessible locations. Some of this work is nothing less than deliberate wastage on the part of working people.

Study Scale Models

Woodworking craftsmen of Ford Motor Co. are now engaged in building scale models of dozens of the company's plants and their entire production facilities. Model of the Lincoln Division plant was illustrated in STEEL, Feb. 17, p. 89. The four-story 1700-foot "B" building at the Rouge plant is now being built in miniature, and will cover a table 17 ft wide by 50 ft long. Scale models of assembly plants in Metuchen, N. J., St. Louis, Atlanta and Los Angeles shortly will be built.

Models of industrial plants have been used for years as display pieces, a spectacular example being the entire Ford Rouge plant which was set up in miniature on the second floor at Gate 4. Now, however, the models are being studied by tool engineers, plant layout experts, materials handling personnel and others to determine more accurately the sequence and layout of production operations. Models are far superior to drawings or two-dimensional layouts, both from a visual standpoint and because they can be rearranged quickly.

Ford uses the standard scale of ¼-in. to the foot for models of plants and machines, even including miniature figures of workmen, cars, trucks, fixtures, conveyors, ovens, spray booths, cranes and other equipment. All moving p of machines and equipment are pain yellow. Stationary items like bench heat treating furnaces, tanks and like are painted green, while stock st age bins and piles are shown in silv Plastic figures representing the avera size man are shown in position w supervisory employees identified by wh heads with yellow dots, and inspect by red dots on the heads.

Receiving and stock storage are complete with piles of stock, are carv from wood after being drawn to sca Every piece of equipment is reproduc to scale in a wood model and pla in correct position in the building mod Balsa wood, white pine, celluloid, w drill rod, paper, glue and paint are standard materials used in model bui ing. Realistic effects achieved are some cases astounding.

Sees 4.7 Million Output

Addressing several thousand auto bile dealers in convention at Atla City, N. J., last week, George Romn managing director of the A.M.A., p dicted output of 3,600,000 passen cars and 1,100,000 trucks and busses d ing 1947. This total of 4.7 million slightly under earlier official predicti of a five-million car year, but still call for the full-year maintenance o higher production level than that r prevailing. Assemblies last week w given a setback by the spreading eff of the tieup in seat cushion springs casioned by a month-old strike at L Young Spring & Wire Co. Briggs M Co. trimmed body output sharply, a Packard announced it would close f lines for at least a week.

Undercover mutterings develo among car dealers during the convent over rumored plans of large compa to extend discounts to employees on p chases of new cars. Some dealers felt t might be blocked out of their establis 24 per cent profits on such sales, discussions apparently being touched by the report General Motors was c templating offering cars to workers this much discount. Pressure from la unions has led several lower-volu producers to make special prices on t cars to employees, though none is gr ing the full dealer discount.

High-Utility Airplane Seat Developed by Boeing

Boeing Aircraft Co., Seattle, has veloped an airplane seat of high uti value and increased comfort, accomm ating persons of any size or weight. C pair of deluxe seats weighs but pounds, requiring but one minute conversion into a wide and comforta bed.

ALLOY SELECTION

The performance of all die castings is based on both good design and proper alloy selection. The zinc alloys, covered by specifications of both the American Society For Testing Materials and the Society of Automotive Engineers, can provide the mechanical properties given in the table below. Your die caster understands the necessity for careful control with respect to every element involved in alloy formulation to assure maximum mechanical properties and dimensional stability.

MECHANICAL PROPERTIES OF ZINC ALLOYS FOR DIE CASTING

PROPERTIES*	ZAMAK†-3 A.S.T.M.-XXIII S.A.E.-903	ZAMAK†-5 A.S.T.M.-XXV S.A.E.-925
Charpy Impact Strength Ft.Lb., ¼"x¼" Bar, as cast	43	43
Tensile Strength, Lbs./Sq. In.	41,000	47,600
Elongation, % in 2 In., as cast	10	7
Brinell Hardness	82	91

*Properties are as determined on the Zamak alloys. These values, as cast, are well above the minimum A.S.T.M. and S.A.E. requirements.

† A trade mark (registered in the U. S. Patent Office) identifying the zinc alloys developed by The New Jersey Zinc Company and used in the die casting industry.

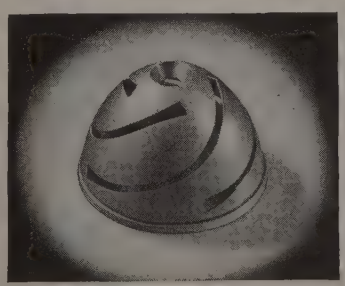
HOLES AND SLOTS — PIERCED VS CORED

In designing die castings, remember that it is often less costly to pierce required holes and slots than to specify that they be cored in the casting operation. Through cored holes always have some flash which must be trimmed and, in many cases, it will be just as easy to pierce such openings through uncored walls as to shear the flash with a punch. Thanks to the high ductility of zinc alloys, piercing, blanking and slotting operations can be performed without deformation of castings.

A good case in point is the zinc alloy die cast housing shown in the above drawing. The only holes cored in this casting are those in six bosses (see A) where thickness exceeds ⅛", and the D-shaped openings at either end (see B) which would be difficult to pierce because of their shape and location. The round holes on the step faces at the ends of the casting, the star-shaped opening in one side and all of the louvres are pierced.

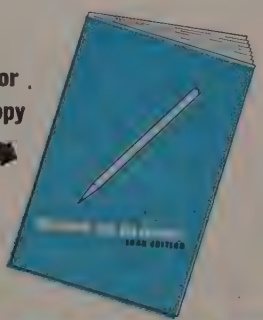
The louvres could not be cored advantageously unless altered in desigh and, even then, a much more expensive die would be required and the openings would contain flash which would be difficult to remove. By forming these louvres in a stamping die, a slitting action is obtained which stretches the metal outward on the side louvres and inward on those at either end. The combination slitting and forming is a very rapid operation and no flash remains in the openings thus produced. The ductile zinc alloy withstands this severe forming without fracture.

The zinc alloy die cast fan hub shown below is another interesting example of piercing. Due to their length and location, the slots for the rubber fan blades in this casting are pierced. Coring of these slots would require a very expensive die and flash removal would still be necessary. The countersunk hole in the nose of the hub is cored, however, since it passes through a fairly heavy boss on the underside.



For additional data on die casting design ask us — or your die casting source — for a copy of the booklet "Designing For Die Casting."

Send for your copy



The New Jersey Zinc Company, 160 Front St., New York 7, N. Y.

ZINC FOR DIE CASTING ALLOYS

The Research was done, the Alloys were developed, and most Die Castings are based on

HORSE HEAD SPECIAL (99.99 + % Uniform Quality) ZINC

Plan Betterment Of Babcock & Wilcox Plant

Program to cost $1,500,000 for new equipment and shop rearrangements at Barberton, O., announced

A MACHINERY replacement program and other plans to improve its Barberton, O., plant over a two-year period have been announced by Babcock & Wilcox Co., New York. The improvements, which will cost an estimated $1,500,000, will include relocation of machinery and rearrangement of certain shops in order to minimize the handling both of raw materials and finished products. Production will continue without interruption.

The money for the project, which will affect all shops, has been allocated, and to date about one-half of the funds have been spent.

"All types of shop equipment and machine tools will be purchased," according to George J. Hartnett Jr., head of the Staff Engineering Department which drew up the program. "The expenditures are made not only to increase plant capacity, but to maintain and improve quality of products. In addition, the major rearrangement of processing machinery and the purchase of certain new equipment, such as dust collectors, will improve shop working conditions.

"The continuous heavy demands made on the plant's facilities during the last decade, and particularly during the war years, accelerated the rate of wear on equipment," he continued. "During the war, although the company needed replacements, as well as more modern machinery in some instances, it was decided, since other manufacturers urgently needed the limited quantity of new equipment then available, to delay purchase until after the cessation of hostilities when a comprehensive program of modernization could be instituted. Equipment added during the war years was absolutely essential to handle the increased production requirements." Mr. Hartnett estimated that some machines purchased at the outset of the war had now been through the equivalent of 15 years of normal operation.

FOR ROOFTOP PLANT: A section for one of two boilers for a unique heating plant installation atop the 18-story Kirby Bldg., Dallas, Tex., arrives at the roof's edge. Products of the Pacific Steel Division of United States Radiator Corp., the two 17,000-lb. steel boilers were hoisted by a 24-in. base beam extending over the street. A trolley that rolled along the beam supported the hoisting cables. Installation of the heating plant became necessary when a nearby building ceased providing heat to the Kirby building, and a roof-top site was chosen because basement location was impractical

Plant of Joshua Hendy Leased to Westinghouse

Westinghouse Electric Corp., Pittsburgh, has entered into a lease arrangement with Joshua Hendy Iron Works to take over the latter company's Sunnyvale, Calif., plant. Under the terms of the 10-year lease, Westinghouse will have an option to purchase, according to a joint announcement by John A. McCone, Joshua Hendy president, and Harry F. Boe, vice president in charge of Westinghouse's Manufacturing & Repair Division.

Record Year for Hydraulic Press Mfg. Co. Set in 1946

Reporting the best year in the 69-year history of Hydraulic Press Mfg. Co. and subsidiaries, Mt. Gilead, O., H. A. Toulmin Jr., chairman and president, in the companies' annual report released last week announced that net sales for 1946 totalled $7,388,219 compared with $4,013,497 for 1945.

Net earnings for the year amounted to $431,347 compared with 1945's earnings of $146,641. Total assets as of Dec. 31, 1946, were $5,178,982, net gain of $886,857 over the previous year.

Research in the fields of plastics, powder metallurgy, die casting and hydrauli engineering has progressed satisfactorily Mr. Toulmin said, and added that tw new products have recently been put int production. One, a new mass productio pump of 1000-lbs pressure, is expected t have applications in fields which the com pany has not previously supplied, such a dump trucks, road graders, agricultura implements, machine tools, conveyors an similar uses. The other product, a ne type valve, has greater efficiency tha was heretofore believed possible, M Toulmin asserted.

Seek Stockholders' Approva For Moore, Conlon Merger

Stockholders of the Conlon Corp Chicago, and the Moore Corp., Jolie Ill., will vote Feb. 26 on a proposal t merge Conlon into Moore, the survivin company to be known as Conlon-Moor Corp. Conlon bought the controllin stock interest in Moore in Decembe 1945. Assets of the proposed corporatio would be in excess of $3 million. Bot companies produce household appliance

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Stevens Institute of Technology, oboken, N. J., has signed a contract ith U. S. Office of Naval Research to udy motion of atoms in metals under ress.

—o—

Kennametal Inc., Latrobe, Pa., manucturer of carbide tools, has opened an ffice in Buffalo under direction of Harry . Bearfoot.

—o—

Cleveland Automatic Machine Co., hich recently moved its general headuarters to Cincinnati, has opened a disict office in Cleveland with V. J. annon as manager.

—o—

Budd Co., Philadelphia, has designed cabin-type, sleeping car accommodation constructed that the passenger can wer his berth into position without asstance.

—o—

Yoder Co., Cleveland, manufacturer electric weld tube, pipe mills and cold ll forming machines, is opening a sales nd engineering consultation office in hicago under the direction of T. K. ckhardt.

—o—

Ermac Co., Los Angeles, machine tool stributor, has moved to larger quarters nd has been incorporated.

—o—

Atchison, Topeka & Santa Fe Railway, os Angeles, has ordered from Baldwin ocomotive Works a gas turbine locomove using oil as fuel. To cost $500,000, e unit will be used for passenger serce.

—o—

Taylor Instrument Cos., Rochester, . Y., have dropped escalator clauses om sales contracts.

—o—

Nottingham Steel Co., Cleveland, has mpleted a $35,000 program tripling its pacity. The project included an office ilding with 6500 sq ft and remodeling warehouse containing 100,000 sq ft of or space.

—o—

Dardelet Threadlock Corp., Detroit, vner of patent rights on a self-locking rew thread, has changed its name to ck Thread Corp.

—o—

Adolph I. Buehler, Chicago, has been pointed exclusive agent in the United ates and Canada for Swiss-made Amsler ting equipment.

—o—

Western Aircraft Tool Co., Los Anles, manufacturer of precision gears, has moved into its new office and factory in Burbank, Calif.

—o—

Jack & Heintz Precision Industries Inc., Bedford, O., has begun production of open-type refrigeration compressors and next month will begin the output of hermetic refrigeration compressors.

—o—

P. A. Patterson Co. Inc., Philadelphia, representative for tool and die manufacturers, has been reorganized with John C. Wilcox as president. P. A. Patterson, former head of the company, will continue in an advisory capacity.

—o—

Air Materiel Command, Army Air Forces, Wright Field, O., is furthering its all-weather flying program in the United States with radio landing systems. Nearly 50 of the approximately 200 instrument approach landing systems used during the war have been relocated at airfields within the United States.

—o—

SKF Industries Inc., Philadelphia, has purchased a plant at Hornell, N. Y., to provide larger facilities for manufacture of anti-friction bearing pillow blocks now produced at its Philadelphia plant. The Hornell facility was bought from F. A. Smith Mfg. Co., Rochester.

—o—

Chemicals Division, Pittsburgh, Aluminum Co. of America, will merchandise alumina and fluoride products of Aluminum Ore Co., an Alcoa subsidiary which will continue manufacture of the products.

—o—

General Regulator Corp., New York, subsidiary of Foster Wheeler Corp., has appointed Hayden & Co., Chicago, as representative for its line of combustion control systems in Illinois, Indiana, Iowa, Minnesota, Wisconsin and portions of Missouri and Ohio.

—o—

Towmotor Corp., Cleveland, manufacturer of lift trucks and industrial tractors, has completed a building addition to its Cleveland plant which will add more than 33,000 sq ft of area for assembly lines.

—o—

Castle Films, New York, division of United World Films Inc., has published a catalog listing films released during the past year for school and industrial training purposes. Available are 730 movies on 16 mm film and 585 filmstrips for 35 mm slidefilm projectors.

—o—

Battelle Memorial Institute, Columbus, O., for the year beginning in the summer or fall of 1947, will appoint a limited number of predoctoral fellows and post-doctoral associates to conduct investigations in industrial research at the institute.

—o—

Chevrolet Division, Detroit, General Motors Corp., has leased an aluminum forgings plant at Saginaw, Mich., from WAA.

—o—

Carboloy Co. Inc., Detroit, manufacturer of carbide tools, has named Kendall Hardware-Mill Supply Co., Battle Creek, Mich., as distributor.

—o—

Ward Leonard Electric Co., Mount Vernon, N. Y., manufacturer of electric control devices, has appointed Southern Sales Co., Fort Wayne, Ind., as its representative in Indiana and western Kentucky.

—o—

Labor Relations Institute, New York, has published a manual of contract provisions, procedures and policies for the guidance of management.

—o—

Blaw-Knox Co., Pittsburgh, has purchased from WAA a surplus cast armor tank plant there which it operated during the war. Plant will be used to produce steel castings.

—o—

H. O. Canfield Co., Bridgeport, Conn., manufacturer of rubber parts, has completed its modernization and expansion program and is now in full production.

—o—

American Car & Foundry Co., New York, recently awarded its Stevenson Safety Trophy to its foundry in St. Louis and its plant at Madison, Ill., for their safety records in 1946.

—o—

Lewis Foundry & Machine Division, Pittsburgh, Blaw-Knox Co., has received an order for two rolling mills and accessories from Laninacao Nacional de Metals S. A., Sao Paulo, Brazil. The order amounts to about $1 million.

—o—

Consolidated Steel Corp., Los Angeles, has sent nine shipbuilding specialists from its Orange, Tex., plant to the Philippine Islands to supervise establishment of a shipbuilding program for the Philippine government.

—o—

Hall & Liles, Detroit, management consultants, has published a booklet entitled "Changing Attitudes in Industry" dealing with increasing production and bettering employee relations.

—o—

Anderson Iron Works, Kilgore, Tex., has plans to move its Houston and Ft. Worth, Tex., plants to a new factory under construction in Kilgore.

Steel, Auto Gains Boost Industrial Activity Index

INCREASED output of steel and automobiles contributed substantially to a 4-point rise that pushed STEEL's industrial production index for the week ended Feb. 15 back up to 157 per cent of the 1936-1939 average of 100.

After reaching a new postwar high of 93.5 per cent of capacity that week steel ingot production continues to show strength, with indications that further new postwar peaks are not far away. While this is encouraging, the high production rate will have to be maintained for some time before the supply of steel, particularly flat-rolled, catches up with the heavy demand.

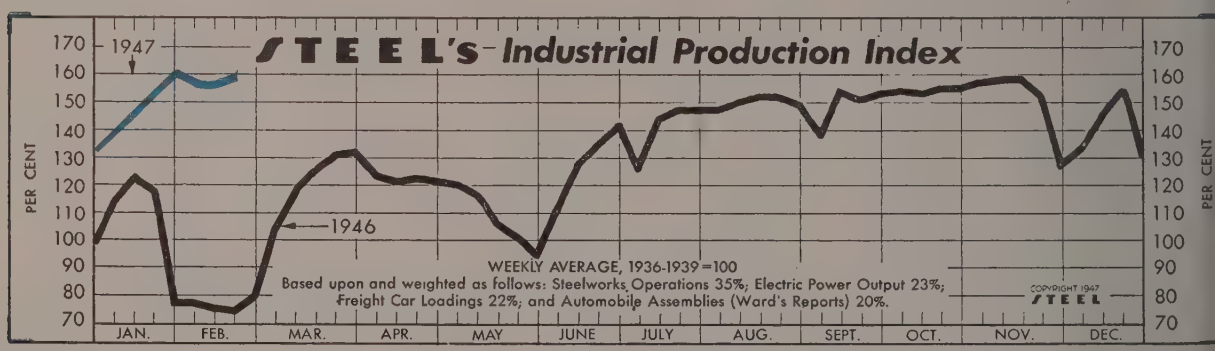
Moderating of weather with resultant lifting of limitations on industrial use of natural gas made it possible for the automobile industry to raise its output in the week ended Feb. 15 to an estimated 93,592 passenger cars, trucks and busses, compared with 89,958 in the preceding week. However, the output was not as high as it could have been had there been no interference in the gas supply. Effects of the temporary limitations will be felt, however, for some weeks in the future through reduced supplies of components and materials.

COAL—After rising to a new postwar high of 13,775,000 tons in the week ended Feb. 1, bituminous coal output receded to an estimated 12,290,000 tons in the week ended Feb. 8. However, production in 1947 through Feb. 8 was 3.4 per cent ahead of that for the corresponding perio of last year.

PRICES—Price advances in most commodity groups raise average primary market prices one per cent in the wee ended Feb. 8. This put the commodity wholesale pri index of the U. S. Bureau of Labor Statistics up to 141 per cent of the 1926 average of 100, 0.6 per cent abo the previous postwar peak of mid-January.

COPPER—Tightness in the copper supply is influencin some consumers, particularly in the electrical field, begin importing copper despite a 4-cent-per-pound tari With negotiations for suspension or reduction of the tar apparently stalemated in Washington, some copper co sumers foresee an uncomfortable pinch in copper suppli as soon as stocks imported by the government are e hausted.

TRUCK LOADINGS—Motor carriers transported mo freight in December, 1946, than in any December on re ord, the American Trucking Associations Inc., Washin ton, reported. This high level activity put the associ tions' index at 189 per cent of the 1938-1940 average 100. November's index was 193, and high point for th year was 204 per cent in August and October. For th year, the index average was 184, highest of any peac time year and exceeded only by the 186 per cent in th record war year of 1943. One factor in the high volum of tonnage moved by truck in 1946, said the ATA, wa increased movement of freight in less-than-carload lots t meet urgent consumer demand for many short articles a quickly as they were produced.



The Index (see chart above): Latest Week (preliminary) 157 Previous Week 153 Month Ago 152 Year Ago 7

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Yea Ago
Steel Ingot Output (per cent of capacity)†	93.5	92	91	5
Electric Power Distributed (million kilowatt hours)	4,778	4,801	4,857	3,94
Bituminous Coal Production (daily av.—1000 tons)	2,048	2,296	2,283	2,08
Petroleum Production (daily av.—1000 bbls.)	4,758	4,770	4,624	4,71
Construction Volume (ENR—Unit $1,000,000)	$54.8	$111.5	$110.2	$44
Automobile and Truck Output (Ward's—number units)	93,592	89,958	75,166	21,53

* Dates on request. † 1947 weekly capacity is 1,749,928 net tons. 1946 weekly capacity was 1,762,381 net tons.

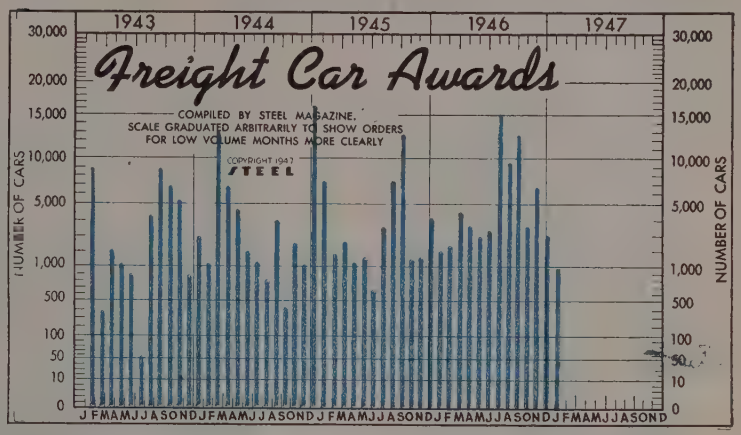
TRADE				
Freight Carloadings (unit—1000 cars)	825†	767	828	70
Business Failures (Dun & Bradstreet, number)	62	45	51	2
Money in Circulation (in millions of dollars)‡	$28,346	$28,295	$28,518	$27,96
Department Store Sales (change from like wk. a yr. ago)‡	+2%	+10%	+24%	+2

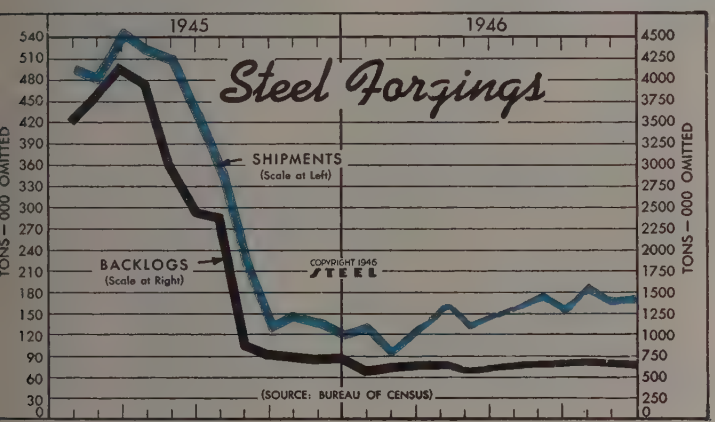
† Preliminary. ‡ Federal Reserve Board.

Freight Car Awards

	*1947	*1946	1945	1944	1943
. . .	9,905	1,500	7,200	1,020	8,365
b. . .	....	2,403	1,750	13,240	350
r. . .	....	4,512	2,500	6,510	1,935
r. . .	....	3,764	1,120	4,519	1,000
y . .	....	3,025	1,526	1,952	870
e . .	....	3,335	670	1,150	50
y . .	....	14,836	3,500	795	4,190
g. . .	....	9,629	7,240	3,900	8,747
t. . .	....	12,768	12,840	400	6,820
t. . .	....	3,407	1,320	2,425	5,258
v. . .	....	6,707	1,650	1,065	870
c. . .	....	3,041	4,116	16,245	2,919
tal		68,927	45,432	53,221	41,374

*American Railway Car Institute.


Freight Car Awards
1943
1944
1945
1946
1947
COMPILED BY STEEL MAGAZINE.
SCALE GRADUATED ARBITRARILY TO SHOW ORDERS FOR LOW VOLUME MONTHS MORE CLEARLY
COPYRIGHT 1947 STEEL
NUMBER OF CARS
30,000
20,000
15,000
10,000
5,000
1,000
500
100
50
10
0
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D



Steel Forgings

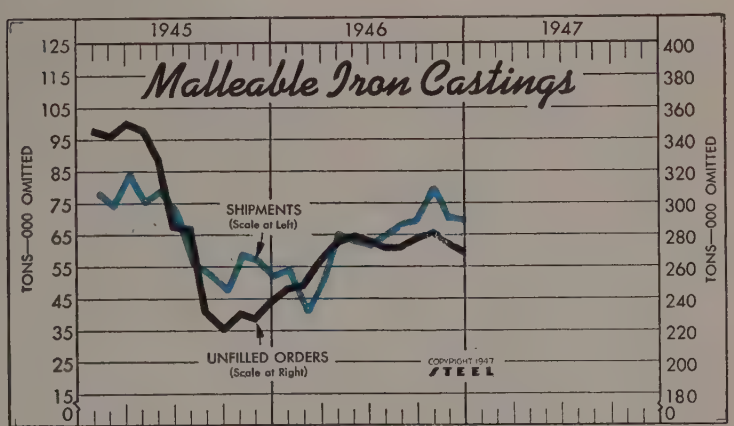
Tons—000 omitted

	Shipments 1946	Shipments 1945	Unfilled orders* 1946	Unfilled orders* 1945	Consumption of steel 1946	Consumption of steel 1945
Jan. . . .	130	498	561	3,502	182	644
Feb. . . .	93	483	596	3,826	125	628
Mar. . . .	123	549	612	4,139	164	718
Apr. . . .	155	524	604	3,961	208	666
May . . .	139	510	599	2,989	197	655
June . . .	147	430	610	2,420	204	548
July . . .	154	345	624	2,356	214	438
Aug. . . .	171	227	639	841	243	293
Sept. . . .	162	126	648	745	233	172
Oct. . . .	189	145	707	735	271	197
Nov. . . .	171	135	700	708	238	185
Dec. . . .	172	119	677	724	244	156

*Forgings for sale.

Malleable Iron Castings

	Shipments (000 omitted) 1946	Shipments (000 omitted) 1945	Unfilled orders for castings for sale (000 omitted) 1946	Unfilled orders for castings for sale (000 omitted) 1945
a.	53.7	78.8	246	345
b.	40.2	75.2	248	342
r.	50.2	85.3	263	350
r.	65.0	76.1	275	346
y	62.6	79.6	279	328
e	61.6	72.0	276	285
y	64.4	55.8	272	284
g.	67.9	52.6	272	232
t.	69.5	47.0	277	220
t.	79.2	59.1	281	230
v.	69.0	57.3	278	227
c.	68.3	52.0	268	237



NANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$9,824	$13,276	$12,105	$10,459
Federal Gross Debt (billions)	$259.4	$259.1	$259.5	$279.5
Bond Volume, NYSE (millions)	$16.4	$27.9	$26.7	$30.3
Stocks Sales, NYSE (thousands)	5,317	7,908	5,896	7,581
Loans and Investments (billions)†	$55.6	$55.8	$55.6	$68.2
United States Gov't. Obligations Held (millions)†	$35,592	$35,636	$35,802	$49,716

† Member banks, Federal Reserve System.

ICES

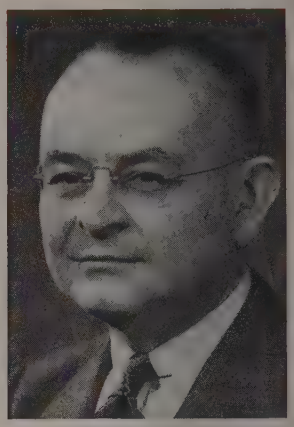
STEEL's composite finished steel price average	$69.36	$69.36	$69.36	$58.27
All Commodities†	141.7	140.3	140.0	107.1
Industrial Raw Materials†	153.1	152.6	153.1	119.3
Manufactured Products†	137.5	135.6	135.4	103.2

† Bureau of Labor Statistics Index, 1926=100.

Men of Industry

ADM. BEN MOREELL

WILFRED SYKES



M. C. PATTON

Admiral Ben Moreell, for the past several months president and director of Turner Construction Co., New York, has been elected board chairman, chairman of the executive committee and president of Jones & Laughlin Steel Corp., Pittsburgh. He succeeds **H. E. Lewis,** retiring because of ill health, but who continues as a director and member of the executive committee.

Admiral Moreell had been federal coal mine administrator. During the war he organized and headed the Navy's Seabees and expedited the construction of aviation gasoline plants. As a result of his outstanding war service, he was awarded meritorious honors by our government, Great Britain and the Republic of Haiti.

In 1945 he was in charge of strike-bound oil refineries and pipelines which had been seized by the Navy, and last year was in charge of operating the nation's coal mines during the period of strikes and government control.

Admiral Moreell will start active duties with Jones & Laughlin on March 17. He will, however, continue as president of Turner Construction Co. until June 1 and he will continue a director of that company after that date.

—o—

Francis J. Kennerley has been elected to the board of directors, Hercules Powder Co., Wilmington, Del. He will continue to serve as secretary of the company.

—o—

J. F. Pryor has been appointed president, Magnolia Airco Gas Products Co., a subsidiary of Air Reduction Inc., New York. **W. A. Sherman** and **R. F. Crow,** former president and executive vice president, who have been closely associated with the company for many years, will continue this association as directors of the company. **R. A. Merritt** and **J. D. Schwartz** have been appointed vice presidents.

—o—

Wilfred Sykes, president, Inland Steel Co., Chicago, has been elected president of the Chicago Association of Commerce & Industry.

—o—

M. V. Cornell, Marion Power Shovel Co., Marion, O., has been appointed sales manager for the company. He succeeds **Walter N. Westland** who recently resigned to join the sales organization of the Cummins Engine Co. Inc., Columbus, Ind.

—o—

The Traffic Committee, Copper & Brass Research Association, New York, has re-elected **F. H. Vickery,** traffic manager, Chase Brass & Copper Co. Inc., Waterbury, Conn., as chairman, and **T. E. Veltfort,** manager, Copper & Brass Research Association, as secretary.

—o—

Electric Household Utilities Corp., Chicago, has announced the following promotions within its organization: **Walter F. Oberst,** formerly vice president, Meadows Division, Bloomington, Ill., has been appointed president of that division; **Owen G. Nugent,** formerly eastern division manager, has been named vice president in charge of manufacturing; **A. R. Nickson** has been appointed vice president in charge of plant engineering for all plants.

—o—

Larry Robbins, senior vice president, Eversharp Inc., Chicago, has been advanced to executive vice president. **Tom Emerson,** vice president in charge of sales, has been named vice preside and general sales manager. **C. L. Frede ick,** formerly executive vice presider becomes special assistant to the presider

—o—

M. C. Patton, assistant general ma ager of Armco Drainage & Metal Pro ucts Inc., Middletown, O., subsidiary the American Rolling Mill Co., has be named vice president and assistant ge eral manager of the company.

—o—

Ceco Steel Products Corp., Chicag has announced the following appoi ments: **William W. Forst** and William DuRell, assistant managers of the Scre & Weatherstrip Division; **Floyd O. Goo will,** general credit manager; **John Davenport** and **Harold J. Kovar,** assista controllers; **William H. Ellsworth,** sistant general counsel; **Paul A. Kueh** assistant purchasing agent; **David Hefele,** assistant advertising manag and **E. C. Bangham,** assistant manag Washington office.

—o—

Ritner W. Tomlinson, Pennsylva Salt Mfg. Co., Philadelphia, has be appointed superintendent of the East Pa., plant of the company.

—o—

A. C. Ziebell, president, Univers Foundry Co., Oshkosh, Wis., has be nominated for a three-year term as rector of the American Foundryme Association.

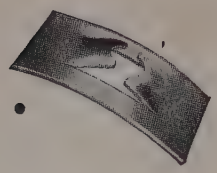
—o—

E. G. Beckey, vice president, Ft. Dea born Mfg. Co., Sterling, Ill., has be appointed to succeed the late **Neill Saunders** as president and general ma ager of the company.

—o—

G. S. McKenty, formerly associat

This is a SPEED NUT*.....



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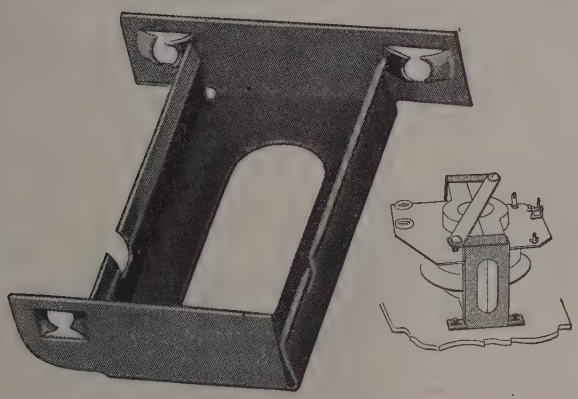


THIS is also a Speed Nut*!

Of course you recognize the Standard SPEED NUT shown above, but just look at the "nightmare" our development engineers dreamed up, to provide multiple fastening and operational functions in a single unit! It is used in the assembly and mounting of television transformers (see sketch) and you can readily understand its advantages over special mounting brackets and individual, hard-to-handle threaded nuts and lock washers.

In addition to the widely-used standard types of SPEED NUTS, hundreds more are *functionally* designed to combine assembly operations, eliminate unnecessary handling of parts, speed-up production and thereby reduce final costs. They are fabricated on specially designed, automatic machines which produce *completely finished* parts at high speeds.

There must be some step in the assembly of your product where, by changing over to SPEED NUTS, your costs could be reduced and your product improved. Why not send us your assembly details, or better still, send in the parts involved. We will be glad to give you a complete fastening analysis . . . at no cost.

TINNERMAN PRODUCTS, INC.
2039 FULTON ROAD • CLEVELAND 13, OHIO

In Canada: Wallace Barnes Co., Ltd., Hamilton, Ont.
In England: Simmonds Aerocessories, Ltd., London
In France: Aerocessoires Simmonds, S. A., Paris
In Australia: Aerocessories, Pty., Ltd., Melbourne

Speed Nuts* PATENTED

MORE THAN 4000 SHAPES AND SIZES

* Trade Mark Reg. U. S. Pat. Off.

FASTEST THING IN FASTENINGS

with LeTourneau Inc., has been appointed merchandising manager of the Road Machinery Division, Heil Co., Milwaukee.

—o—

Victor R. Krause has been appointed manager of the Aluminum Division in Milwaukee of the Reynolds Metals Co., Richmond, Va.

—o—

A. G. de Sherbinin, owner and founder of A. G. de Sherbinin & Co., New York, has been appointed vice president of Pagel, Horton & Co. Inc., of that city. He will be in charge of the company's Metal Products Division.

—o—

R. G. Mumma, formerly manager of the Tap Division, Landis Machine Co., Waynesboro, Pa., has been named assistant secretary of the company. **R. E. Yingling,** formerly in charge of the New York territory, has been named assistant sales manager.

—o—

Samuel L. Moffatt has been appointed superintendent of the open hearth department, Portsmouth Steel Corp., Portsmouth, O.

—o—

D. M. Morewood has been appointed assistant vice president, traffic department, United States Steel Corp. of Delaware.

—o—

John A. Comstock has been appointed engineer of materials at the Ithaca, N. Y., plant of Morse Chain Co., New York, subsidiary of Borg-Warner Corp., Chicago.

—o—

The board of directors of the Continental Bridge Co., Chicago, has elected the following officers: **Stevens A. Bennett,** chairman; **Roy E. Smith,** president; **Stanley A. Archer,** vice president, sales; and **John W. Gifford,** secretary-treasurer. Mr. Smith, who was elected president, recently came to the company from the Kelly O'Leary Steel Works Inc., Chicago, where he was vice president in charge of sales.

—o—

George E. Evans, Mathieson Alkali Works, New York, has retired as metallurgist in charge of fused alkali products for the metals trade. **R. C. Strong** has been appointed manager of the Fused Alkali Division. Mr. Evans will act as a consultant of the company.

—o—

Carl S. Vogel has been elected to the board of directors, Edgcomb Steel Co., Philadelphia. Mr. Vogel has been associated with Edgcomb for the past 18 years and will continue to serve as manager of sales.

—o—

Preston M. Hall has been appointed technical executive of the Resistance Welder Manufacturers' Association, Philadelphia. Mr. Hall served as chief of the Resistance Welding Section, WPB, during the war, and in the summer of 1945 the government sent him to Europe as a special scientific consultant on welding.

—o—

Herbert M. Hodges, director of the foreign department, Monsanto Chemical Co., St. Louis, has retired.

—o—

George N. Sieger, president of S-M-S Corp., Detroit, has been elected president of the Resistance Welder Manufacturers Association. Prominent in the welding industry, Mr. Sieger has, for years, been active on committees of the American Welding Society and now serves as second vice president of that organization. **T. S. Long,** vice president and general manager, Taylor-Winfield Corp., Warren, O., has been elected vice president of the RWMA.

—o—

Merritt Wolfe, Joyce Machine Co., Hatboro, Pa., has been elected vice president and general manager of the company. He had formerly been in char of sales and advertising for the fir and, in his new capacity, will combi these activities with administrati **George Joyce** remains as president a **W. Thomas Joyce** as treasurer. Ce **Cadman** has been elected secretary a **W. W. Mauger** becomes assistant sec tary and comptroller.

—o—

Paul B. Ricks has been appointed rector of public relations, Ekco Produ Co., Chicago, succeeding **Ronald Goo man** who recently resigned.

—o—

The Pennsylvania Flexible Metal Tubing Co., Philadelphia, has opened new branch in Los Angeles which w be under supervision of **Arnold J. Dov** a sales executive with the compa since 1939. The branch will be kno as the Pacific Coast Division of the Pe flex Sales Co., sales organization Pennsylvania Flexible Metallic Tubi Co., with headquarters in Philadelph

—o—

T. C. Ballou has been named manag of welded products sales, American & Foundry Co., New York.

—o—

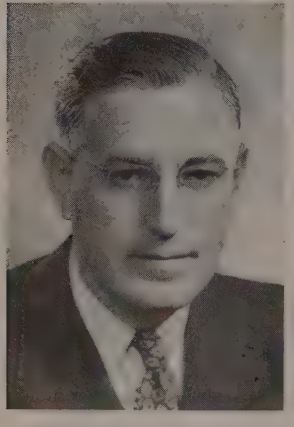
Joseph J. Strachan has been appoint general staff manager of sales, C negie-Illinois Steel Corp., Pittsburg subsidiary of U. S. Steel Corp.

—o—

Gerald E. Rhodes, American Brid Co., Gary, Ind., subsidiary of U. S. St Corp., Chicago, has been promoted assistant manager of the local plant. succeeds **Jay K. Thompson** who has tired after 44 years' service.

—o—

Max Kuniansky, vice president a general manager, Lynchburg Found Co., Lynchburg, Va., has been nominat for president of the American Foundr men's Association in 1947-48 to succe **Sheldon V. Wood,** president of M



ROY E. SMITH

GEORGE N. SIEGER

MAX KUNIANSKY

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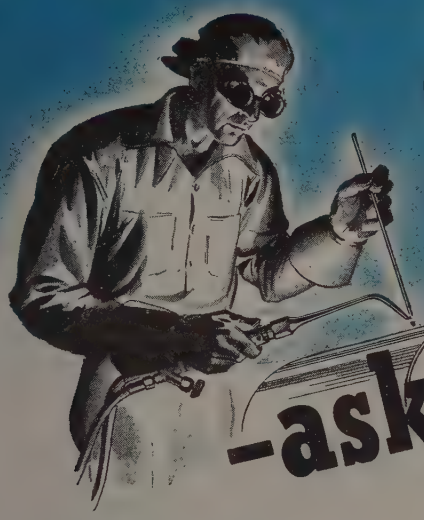

Atomic Hydrogen? Does atomic hydrogen welding of E-S 18-12 Mo (Type 316) produce welds as corrosion resistant as those made by a metallic arc?

Gas-Welding 18-8? What other compositions of chrome-nickel Stainless, besides E-S 18-8 (Type 302) can be oxyacetylene welded?

Tank Annealing? Is it necessary to anneal and pickle small outdoor storage tanks of E-S 18-8 LC (Type 304) after metallic-arc welding?

Weld Vibration? Do spot welds in light gages of E-S 18-8 sheet (Type 302) stand up under rapid vibration over long periods of time?

Bonding-to Steel? What is the best way to join E-S 18-8 Stainless sheet (Type 302) to low-alloy steel hangers without a noticeable joint?

Eastern welcomes your questions about joining stainless steels. Whether they concern arc or gas welding, atomic hydrogen, or heliarc welding of light-gage sheet . . . Eastern Stainless' technical men have answers based on experience. "Eastern Stainless Steel Sheets", a modern book about a modern metal, gives you much data on joining. Send for your copy, and if you need further help, get in touch with any of our 18 offices or distributors.

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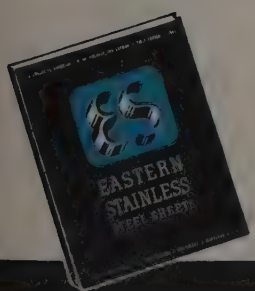

EASTERN STAINLESS STEEL CORPORATION

BALTIMORE 3, MARYLAND • Distributors stock available in most areas

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neapolis Electric Steel Castings Co. whose term expires in July. Mr. Kuniansky has been AFA vice president. He will be succeeded in that position by **William B. Wallis**, president, Pittsburgh Lectromelt Furnace Corp., Pittsburgh. On his retirement Mr. Wood will serve a one-year term as an AFA director, succeeding **F. J. Walls**, International Nickel Co., Detroit, the association's immediate past president.

—o—

William V. Bush has been elected president of the Detroit Sheet Metal Works, Detroit, and **Walter V. Baker**, recently returned from service in the U. S. Army, has been elected vice president.

—o—

John S. King, Fairbanks, Morse & Co., Chicago, has been appointed manager of the Chicago branch house of the company, succeeding **Frank V. Roy** who will retire Mar. 1.

—o—

Roland E. Nelson has been appointed manager of the Chicago office, H. K. Porter Co. Inc., Pittsburgh. He succeeds **George L. Green.**

—o—

W. O. McMahon, foundry metallurgist, sales department, Sloss-Sheffield Steel & Iron Co., Birmingham, has resigned to engage in private foundry consulting work.

—o—

Edwin T. Jackman has been named manager, Bar Steel Division, Charles G. Stevens Co., Chicago. He was formerly Chicago district manager, Firth-Sterling Steel Co., McKeesport, Pa.

—o—

Ben T. Cowherd has been elected a vice president, Republic Drill & Tool Co., Chicago, in charge of hardware sales in the eastern states, with headquarters in New York.

—o—

R. Templeton Brown, a member of the firm of Mayer, Meyer, Austrian & Platt, attorneys, was elected to the board of directors of the A. M. Castle & Co., Chicago., to fill the vacancy created by the resignation of **Alfred C. Castle.** The board of directors elected **Carl C. Mueller** vice president in charge of the Seattle branch, replacing **John B. Robbins** who was elected vice president in charge of the Kansas City branch.

—o—

L. F. Holfender has been appointed factory representative, Brush Division, Osborn Mfg. Co., Cleveland. He will make his headquarters in Cincinnati and will cover the Cincinnati, Louisville and Nashville areas.

—o—

James G. Gammel, Osborn Mfg. Co., Cleveland, has been appointed promotion and advertising manager of the Brush Division to succeed **G. O. Rowland** who has resigned. Mr. Rowland will assume direction of the Northern Indiana Supply Co., Kokomo, Ind.

—o—

Paul R. Wineman, B. F. Goodrich Co., Akron, has been named manager, Industrial Products Sales Division in the Seattle district. He succeeds **Fred D. Ranyard** who has retired after 36 years with the company.

—o—

R. R. Hutchinson, Pontiac Motor Division, Pontiac, Mich., has been appointed chief engineer of that division of General Motors Corp.

—o—

Harry T. Silverman has been appointed assistant superintendent, Indiana Harbor Works shops department of Youngstown Sheet & Tube Co.

—o—

Alfred G. Finlay has been appointed manager of the Stainless Steel Sales Division, United States Steel Supply Co., Chicago, subsidiary of U. S. Steel Corp.

—o—

F. H. Eaton, sales engineer, American Car & Foundry Co., New York, and **H. J. Russell**, sales agent of the company have been named assistants to the vice president.

—o—

James P. Bates has been appointed chief metallurgist for the Hyster Co., Portland, Oreg. He will be in charge of materials specifications and heat treating for the company's three plants—Portland, Oreg., and Peoria and Danville, Ill. His headquarters will be in Portland.

—o—

The Allegheny Ludlum Steel Corp., Pittsburgh, has added the following new salesmen to their sales staff: **Joseph B. Parsons, Sidney M. McCroskey, Edward J. Stein, Wallace H. Adamson, George D. Bunder, Harold M. McMeans, William G. Memphill, Robert A. Wille, Edward W. Schnabel** and **George A. Estabrook.**

—o—

Robert W. Wolcott was re-elected president, Lukens Steel Co., Coatesville, Pa. Also re-elected were vice presidents **Charles Lukens Huston, G. D. Spackman, J. F. Wiese** and **F. H. Gordon;** treasurer and assistant secretary, **J. W. Herman;** Stewart Huston, secretary and **Edward K. Myers**, assistant treasurer.

—o—

C. Clark Moore has been named export sales engineer, La Plant-Choate Mfg. Co. Inc., Cedar Rapids, Iowa, with headquarters in New York.

—o—

John C. Cherry, assistant manager of production, Cherry-Burrell Corp., Chicago, has been named a vice preside

—o—

Dr. William A. Mudge has been a pointed director of the technical serv section of the Development & Resea Division, International Nickel Co. In New York. **William F. Burchfield** been appointed assistant director. F merly assistant director, Dr. Mud succeeds **O. B. J. Frazer**, recently ma assistant manager of the division. **Don J. Reese**, while continuing to head Iron & Non-Ferrous Casting Section the division, will also be in charge of field section. The latter position formerly under the direction of **H. French** who was recently made assist vice president of the company. various units of the division's steel sect are now headed by the following: **J. Sands**, engineering steels; **Dr. V. N. Kri bok**, stainless steels; and **T. N. Armstr Jr.**, railway and cast steels.

—o—

L. A. Adams has been appointed sistant manager, sales and service, C cago Vitreous Enamel Products Cicero, Ill., with headquarters in C cago.

—o—

E. C. Troy, chief metallurgist, Do Steel Co., Philadelphia, has been elec vice president in charge of research metallurgy.

—o—

Harold K. Hochschild, the Ameri Metal Co. Ltd., New York, has b elected chairman of the board of dire ors. He will continue to serve also president of the company. **Charles Scott**, general manager of the compa Mexican operations, was elected a rector.

—o—

Emily A. Taylor, Natural Oil Produ Co., Harrison, N. J., has been appoin manager of the Industrial Advertis Division of the company.

—o—

Dr. Charles M. Slack, Westingho Electric Corp., Pittsburgh, was er eously reported in STEEL, Feb. 10 iss as appointed director of research for corporation. Dr. Slack was appoin director of research for the Lamp D sion of the Westinghouse Electric C

—o—

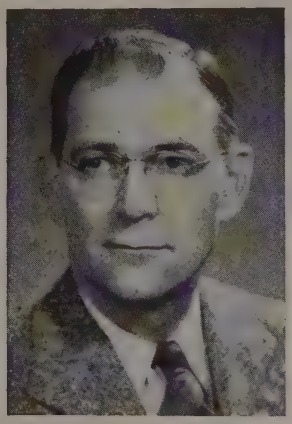
Gerald Z. Wollman has been appoin assistant to the vice president of W inghouse Electric Corp., Pittsburgh, the supervision of the company's Elev Division in Jersey City, N. J., and Sturtevant Division at Hyde Park, M

—o—

J. B. Haskell, manager of sales, & Track Division, West Virginia S & Mfg. Co., Huntington, W. Va., been promoted to manager, market

OTTO W. WINTER

ected president and general manager, Acme ittern & Machine Co., Buffalo. Noted in STEEL, Feb. 17 issue, p. 82.



DR. W. L. McCRACKEN

Appointed director of research and manager of alkali manufacturing, Detrex Corp., Detroit. Noted in STEEL, Feb. 17 issue, p. 84.

WILLIAM T. GOSSETT

Named vice president and general counsel, Ford Motor Co., Dearborn, Mich. Noted in STEEL, Feb. 17 issue, p. 84.

arch and engineering development. He s been associated with the company for years. **W. F. Robinson** will succeed r. Haskell in his former position. **Billy** Owens, who served as an Army Air orce pilot during the war, has been med manager of warehouse sales.

—o—

C. D. D'Amico has been appointed anager, Special Steels Department at e Los Angeles plant of Joseph T. erson & Son Inc., Chicago.

—o—

The Yoder Co., Cleveland, is opening a new sales and engineering consultation office in Chicago which will be under the management of **Theo K. Eckhardt** who has been in the Yoder Co. engineering and sales department for 13 years.

—o—

John D. Lodwick has been elected vice president in charge of sales, Pneumatic Division, Curtis Mfg. Co., St. Louis. **Harry C. Morrison** has been elected vice president in charge of sales, Refrigeration Division of the company.

—o—

Edward A. Linhart has been appointed director of industrial relations for the Follansbee Steel Corp., Pittsburgh. He was formerly associated with the Elastic Stop Nut Corp. of America, Lincoln, Nebr., in industrial relations work.

—o—

Herbert V. Evans Jr. and **H. C. Grieme** have joined the sales department of Alloy Steel Products Co., Linden, N. J.

—o—

Kenneth W. Green has been appointed purchasing agent of the Electric Storage Battery Co., Philadelphia, succeeding the late **William B. Gold.**

OBITUARIES . . .

Herman W. Falk, 79, chairman of the oard and founder of the Falk Corp., d a director of the Allis-Chalmers Mfg. o., died Feb. 17 at Daytona Beach, a., after suffering a heart attack. Mr. lk also was a member of the executive committee of Allis-Chalmers, a member of the board of the Heil Co., and esident of the Falk Investment Co. d the Hope Investment Co.

—o—

Harry Scullin, 79, chairman of the oard of the Scullin Steel Co., St. Louis, ed recently. He was elected chairman the company in 1944 after serving as esident for 46 years. Prominent in St. ouis civic affairs, Mr. Scullin had rved as excise commissioner for St. ouis. In 1933 he was chosen as a ember of the board of three for Missuri to submit to the public works administration, projects for giving employent. He also served as assistant chief the St. Louis district of the ordnance ice and president of the Army Ordnce association.

—o—

Arthur K. Hohmyer, 62, western district manager, Westinghouse Air Brake Co., with headquarters in Chicago, died Feb. 11 in that city. He had been associated with the company since 1901.

—o—

Frederick T. Vaux, 88, retired vice president and treasurer, Adams & Westlake Co., Chicago, died Feb. 15 in that city.

—o—

Fred W. Koehler, 69, died recently at his home in Beverly Hills, Calif. The managing director of several western corporations, he had been president of the Soudan Consolidated Iron Co.

—o—

James Dickerson Coe, 71, president and treasurer, James A. Coe & Co., Newark, N. J., died at his home in Upper Montclair, N. J., on Feb. 14.

—o—

George H. Dunlap, 64, vice president, Alabama Dry Docks & Shipbuilding Co., Mobile, Ala., died Feb. 15.

—o—

William Armstrong, 59, executive vice president, Henry Disston & Sons Inc., Philadelphia, died Feb. 17 in that city.

—o—

Alva J. Fisher, 85, one of the founders of the Hurley Machine Co., Chicago, now the Hurley Machine Division, Electric Household Utilities Corp., and, prior to his retirement in 1928, its first vice president and production manager, died Feb. 14 in Sarasota, Fla.

—o—

Edward F. Shellaberger, 94, founder of the DeKalb Fence Co., DeKalb, Ill., now the DeKalb plant of American Steel & Wire Co.'s Cyclone Fence Division, died Feb. 13.

—o—

George C. Scott, 74, retired president of United States Steel Export Co., New York, died in Plainfield, N. J., Feb. 17.

—o—

Frederick Schroeder, for many years Ohio manager of the O. K. Tool Co., Shelton, Conn., died recently.

—o—

Neill M. Saunders, 48, president and general manager, Ft. Dearborn Mfg. Co., Sterling, Ill., died recently.

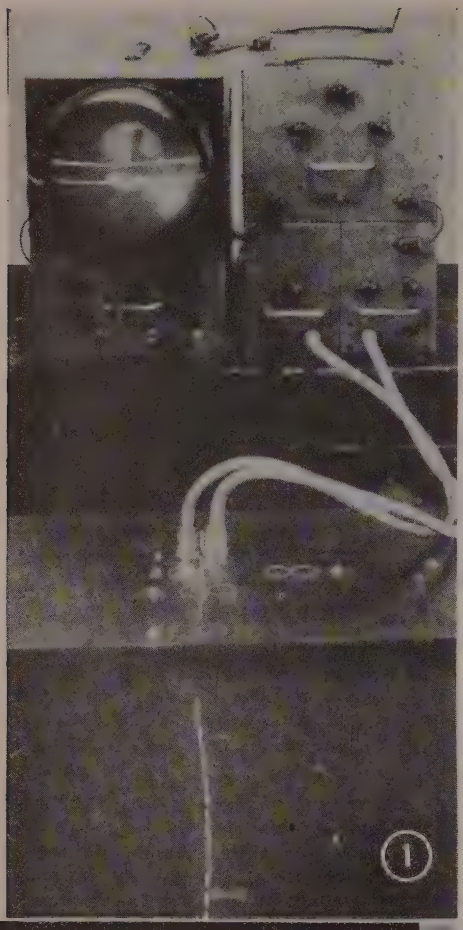
—o—

Carl G. Berggren, 55, vice president and general manager, Special Products Division, Thomas A. Edison Inc., West Orange, N. J., died Feb. 13.

—o—

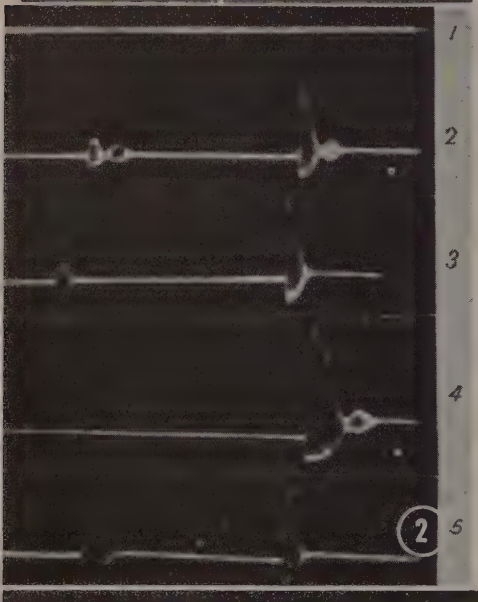
Joseph F. Gettrust, 73, for 35 years Chicago sales representative, Ashton Valve Co., New York, died Feb. 11.

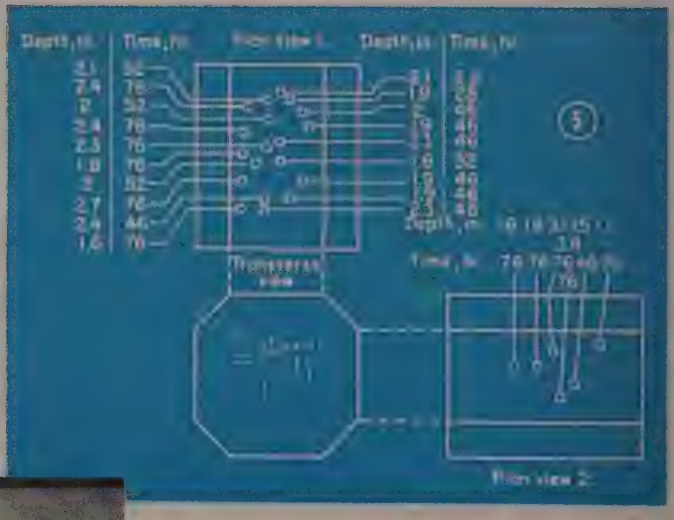
Inspecting Metals with SU

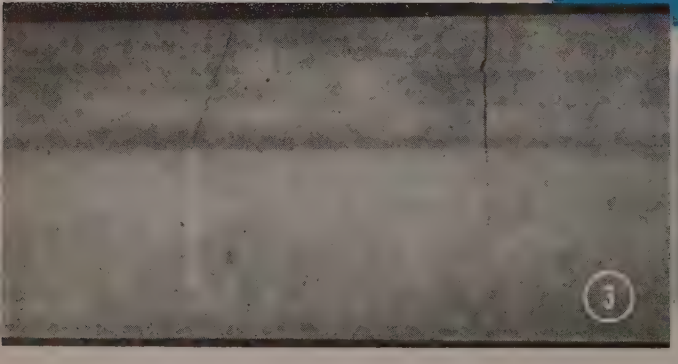


DEVELOPMENTS in supersonic technique (the use of sound whose wave-length is comparable with the dimensions of the flaws to be expected) have made available to the investigator an additional source of information—however, conditions peculiar to large masses can arise which considerably influence the results obtained. With large steel parts there is an almost proportionate increase in heterogeneity with size, and the high degree of sensitivity shown by the supersonic instrument can result—unless such features are taken into consideration—in a false interpretation of unavoidable trivial irregularities, the presence of which is in no way detrimental to the service of the article in question.

This review gives the results of applying this testing method in works practice to larger masses, billets, plates, castings and welds. Conditions necessary for the satisfactory use of the apparatus for practical testing are discussed. It is stated that supersonic examination should be regarded primarily as a new instrument of investigation, capable of giving information about the internal character of large masses of steel, which cannot at present be obtained by other means.







RSONICS

This nondestructive method for detecting flaws is being closely studied by engineers and metallurgists. Discussion of British practice presented here is based upon data prepared for the Iron and Steel Institute of Great Britain

TESTING LARGE MASSES
By H. Nicholson and L. Rotherham
English Steel Corp., Ltd. and
Brown-Firth Research Laboratories, respectively.

In the course of routine inspection or in special inves-ations, it frequently occurs that a knowledge of the idition of internal soundness is of considerable value. personic or echo-sounding principles have been applied eady to a variety of steel forgings and castings of ap-eciable size, and much useful information has been ob-ned. In general, it can be said that every such case uires special and individual consideration, owing to diversities in shape and size among the larger masses. Parts such as shafts and large billets are eminently ted to supersonic testing on account of their uniformity section. But there are many parts of over 12 in. in ss-section which are, of necessity, irregular in form, and these instances comprehensive testing is considerably tricted. Here, localized scanning can yield valuable ormation, especially if carried out in zones of known ceptibility to internal unsoundness. In the selection of h positions a sound metallurgical knowledge of the t in question is of the utmost value.

A number of forged blocks, approximately 15 x 15 x 17 , were examined with the flaw detector, their thermal tory having suggested that internal cracks might be sent. Reflections were obtained from the bottom after difying the time base to extend its range of depth, and re were also several reflections of considerable strength m various points inside the metal. These reflections, ich denoted hair-line cracks, were found to a greater or aller extent in all the suspected blocks, but not in a k whose thermal history had been normal.

Several forging hammer heads of 2 ft cube to 3 ft 6 in. e, all made from the same ingot, were examined. Etch-had shown hair-line cracks meeting the surface, and flaw detector showed many such cracks inside most the tups, though one was found to be practically free m cracks. A strong echo was obtained from the cen-l bore of the tup or hammer head (a few inches in di-eter) when the probes were vertically over it, but ere the bottom surface was considerably inclined to the top surface, the bottom echo was weak or nonexistent over a large area. Near the edges, however, the sides reflected the waves back to the receiver, enabling a bottom echo to be obtained. The main use of the bottom echo is to show that the depth range of the time base is suitably set and that the sensitivity is sufficient; once these are known, the absence of a bottom echo due to geometrical effects alone need not prevent the effective testing of the material.

In testing large steel masses whose length greatly exceeds any other dimension, the labor involved in testing the whole volume of the steel can be reduced considerably by testing from the end face, provided that the flaws to be detected present a sufficient area as seen from the end face of the piece. Two die blocks, approximately 16 x 16 x 54 in., were tested in this way. A major crack had been found in each of the blocks when the impression was cut out, and the flaw detector was used to determine whether the crack visible on the surface extended far into the interior. In each block it was found that the crack covered almost the whole cross-section. A bottom echo could be obtained only with the probes at the edges of the end face, and a strong echo was received from the crack. The test was repeated from the opposite end, giving the same results. Thus each of the blocks contained a completely internal clink.

An interesting example of an alternative method of testing for an internal clink is illustrated in Figs. 1, 2 and 3. A die block, 15 x 16 x 60 in., was examined with the flaw detector on one of the long faces, as shown. A transverse crack was visible on the exterior surfaces at 15 in. from one end, but the supersonic test showed that there was also a completely internal clink at a position 17½ in. from the opposite end.

Immediately over the clink there was no bottom echo at all, the crack apparently serving to dissipate or scatter all transmitted energy. It was found possible to plot the position of the clink by this method, and the results are shown in the photographs. Fig. 1 shows method of testing, and results obtained from various representative positions in the vicinity of the internal clink. Also evident in the traces are indications of hair-line cracks within the

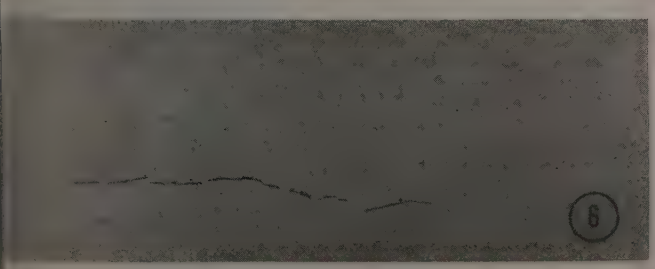
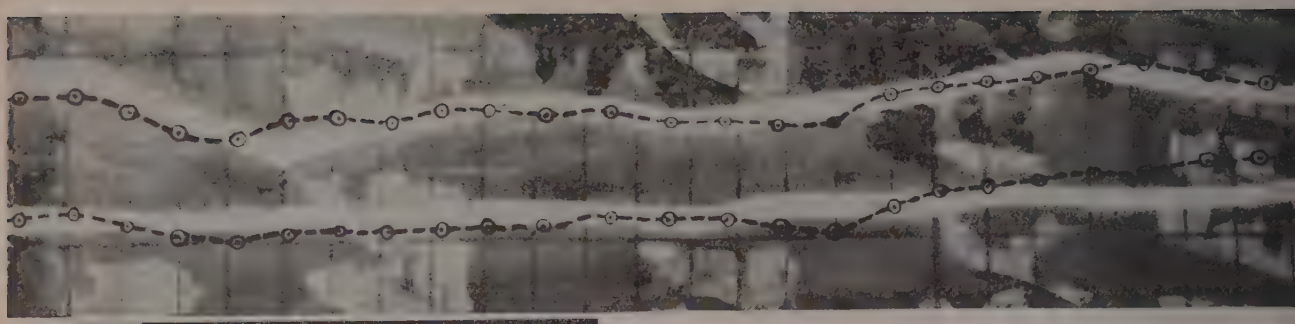
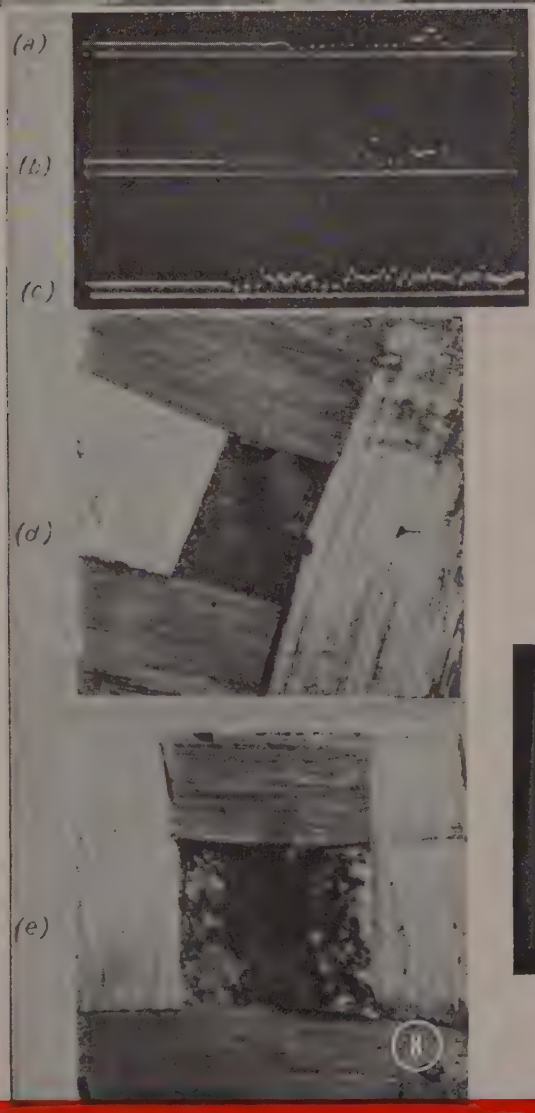
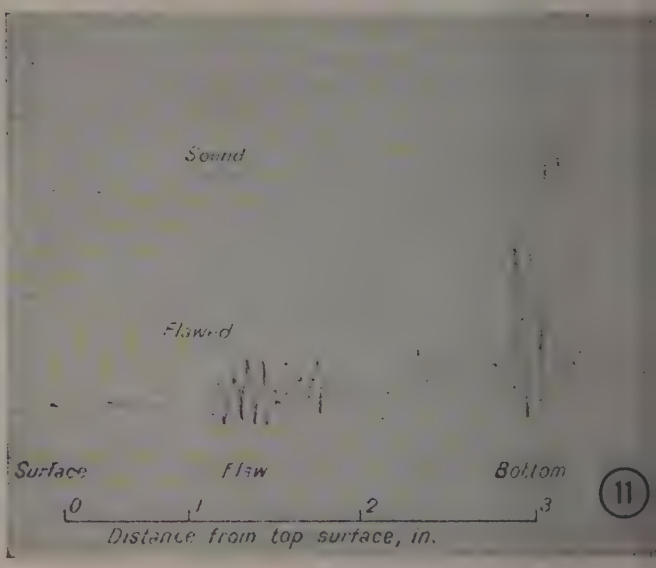


Fig. 1—Method of testing for an internal crack
Fig. 2—Results obtained from various positions, indicated in Fig. 11, in the vicinity of the clink. Indications of hairline cracks are visible within central zone of block
Fig. 3—Coincidence in estimated and actual positions of the clink, after half-sectioning
Fig. 4—Fracture through hair-line cracks
Fig. 5—Development of hair-line cracks with lapse of time
Fig. 6—Internal cracks in forged high-alloy steel







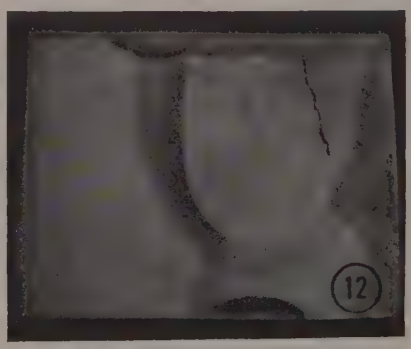


Fig. 7—Laminations in 0.33-in. steel plate, detected by supersonic testing (white line) and confirmed by magnetic etching (black line)

Fig. 8—Detection of pipe in high-alloy steel: (a) Unpiped bar, no defects; (b) edge of piped bar, defects beginning to show; (c) center of piped bar, defects well marked; (d) unpiped bar; (e) piped bar

Fig. 9—Method of using flat probes on gas-cut edge

Fig. 10—Method of using 30-degree wedges for detecting (a) horizontal and (b) vertical defects

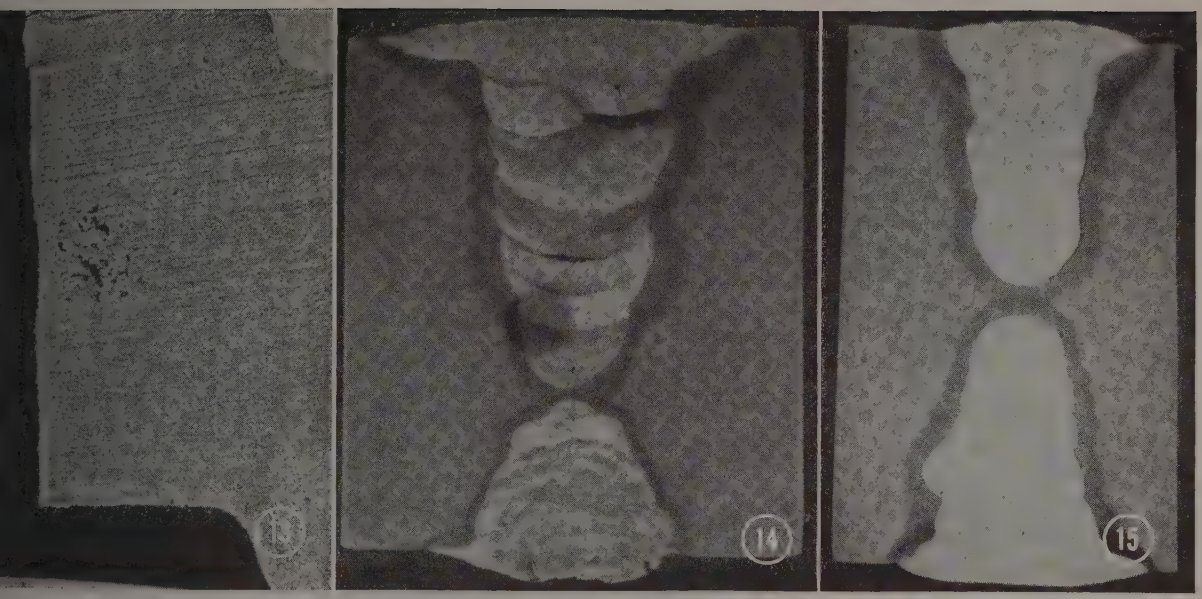
Fig. 11—Pulley casting tested with supersonic waves

Fig. 12—Section through weld showing crack

Fig. 13—Section of pulley casting showing porosity

Fig. 14—Butt weld on 3-in., low alloy steel plate, showing entrapped slag

Fig. 15—Butt welded 3-in. low alloy steel plate, weld made with stainless steel electrodes, showing interfacial defect



tral zone of the block. Fig. 3 shows coincidence in mated and actual positions of the clink, after half-ioning.

Each case for examination has to be taken on its own its, and in order to obtain the most informative re-s possible, it may prove necessary not merely to de-a particular method of approach, but to modify, to ie slight degree, the supersonic instrument itself. An mple of this occurs in the case of two rotor shafts, 15 ong, 18 in. maximum diameter, which were suspected having internal clinks similar to those found in the die cks. The flaw detector was applied to one of the end es with oil as the coupling medium, the quartz disk ng placed directly on the steel; using the 2½-mega-le filter in the receiver, only an extremely weak bottom o was obtained. By changing the output value of the plifier for a more sensitive one, however, the sensitivity increased about threefold, and by putting a tuning in the transmitter circuit a further fivefold increase obtained. With this arrangement, strong bottom oes were obtained, so that testing for flaws could then ceed.

No major flaw echoes were found, so there were ap-ently no clinks. Small echoes were obtained, how-r, in large numbers near the beginning of the trace, at ximum sensitivity. They were evenly distributed both r the cross-section and in depth, and their amplitude reased as their depth increased, becoming too weak to ister beyond about 3 ft. A similar trace was obtained en testing from the opposite end, showing that sensi-ty, in terms of amplitude of echo from a flaw of given , decreases appreciably as the distance increases, be-se of the spreading of the beam. Possibly some form automatic gain control, operated by the time base, could used to give constant sensitivity with variation in dis-ce.

TESTING BILLETS AND BARS

By W. R. Yates, Hadfields, Ltd., Sheffield, England

The supersonic method lends itself especially to testing rolled and forged material. Hair-line cracks, which are an occasional type of defect occurring in this class of product, are readily detected by supersonic examination. As a routine test for billets and bars, this method is more positive for determining freedom from this defect than sectioning followed by magnetic etching. In this test a known volume of the steel is examined, whereas the method of sectioning followed by magnetic etching shows only one plane which may not be representative of the whole length of the mass in question.

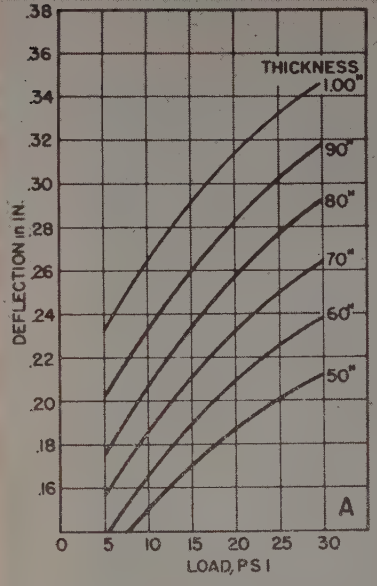
Material may be tested by selecting various bars representative of the cast and preparing surfaces on the portion to be examined by grinding or machining or, alternatively, specimens cut from the bars may be prepared and examined by the apparatus in the laboratory.

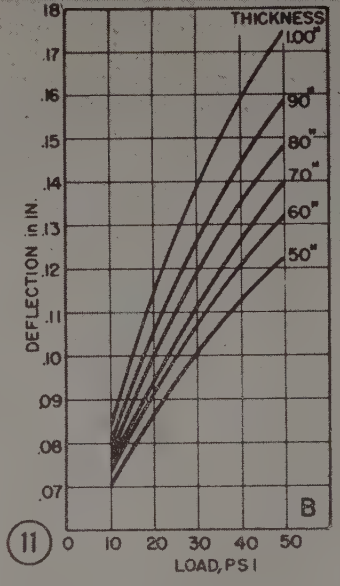
In this class of forged or rolled material it is desirable to obtain some idea of the nature, magnitude, and orientation of flaws indicated by reflection of the supersonic waves.

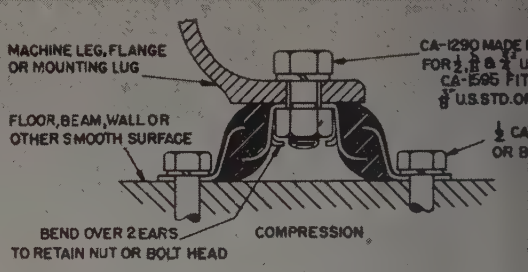
An example occurred in a 6½ in. square billet, where a single hair-line crack was located, and upon sawing at the position of the flaw a crack was seen in one face only; the calculated position was within ¼-in. of the actual position. The length of the hair-line crack was found to be ¼-in. The minimum size of flaw detectable will depend upon the surface area capable of reflecting the supersonic wave.

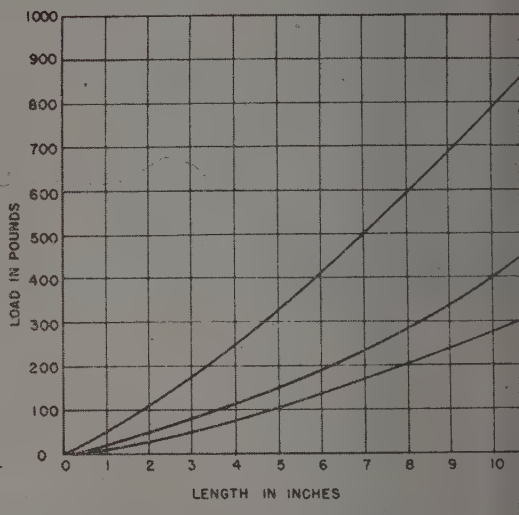
Where the specimen is of circular section, the probes may be rotated until the position of maximum reflection occurs, indicating the position where the greatest surface area is reflecting the supersonic wave to the receiver. In material of rectangular section, the examination is limited to two directions at right angles, and hence the orientation of an internal crack can be determined only approximately.

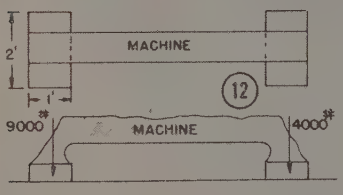
In rolled and forged material, the following types of defects have been observed: (a) Hair-line cracks, (b) internal cracks, (c) segregates, and (d) piping. Where it is possible for two or more of these types of defects to be present in the specimen under examination, it is desirable for the observer to be able to distinguish between the different types of flaws. Internal cracks (a) and (b) can usually be distinguished from segregates and piping (c) and (d), by the scatter- (*Please turn to Page* 114)

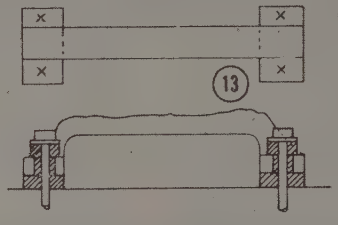





MACHINE LEG, FLANGE OR MOUNTING LUG
FLOOR, BEAM, WALL OR OTHER SMOOTH SURFACE
BEND OVER 2 EARS TO RETAIN NUT OR BOLT HEAD
COMPRESSION







CONTROL OF VIBRATION CAN

By JOHN PARINA, JR.
Associate Editor, STEEL

Increase Production Efficiency

Effective isolation of vibration generated by high speed industrial machinery today is regarded by many to be as indispensable to production economy as correct lubrication or the proper cutting tool. This second article continues the survey of anti-vibration materials available to industry and reviews characteristics of additional standard mountings and methods of application

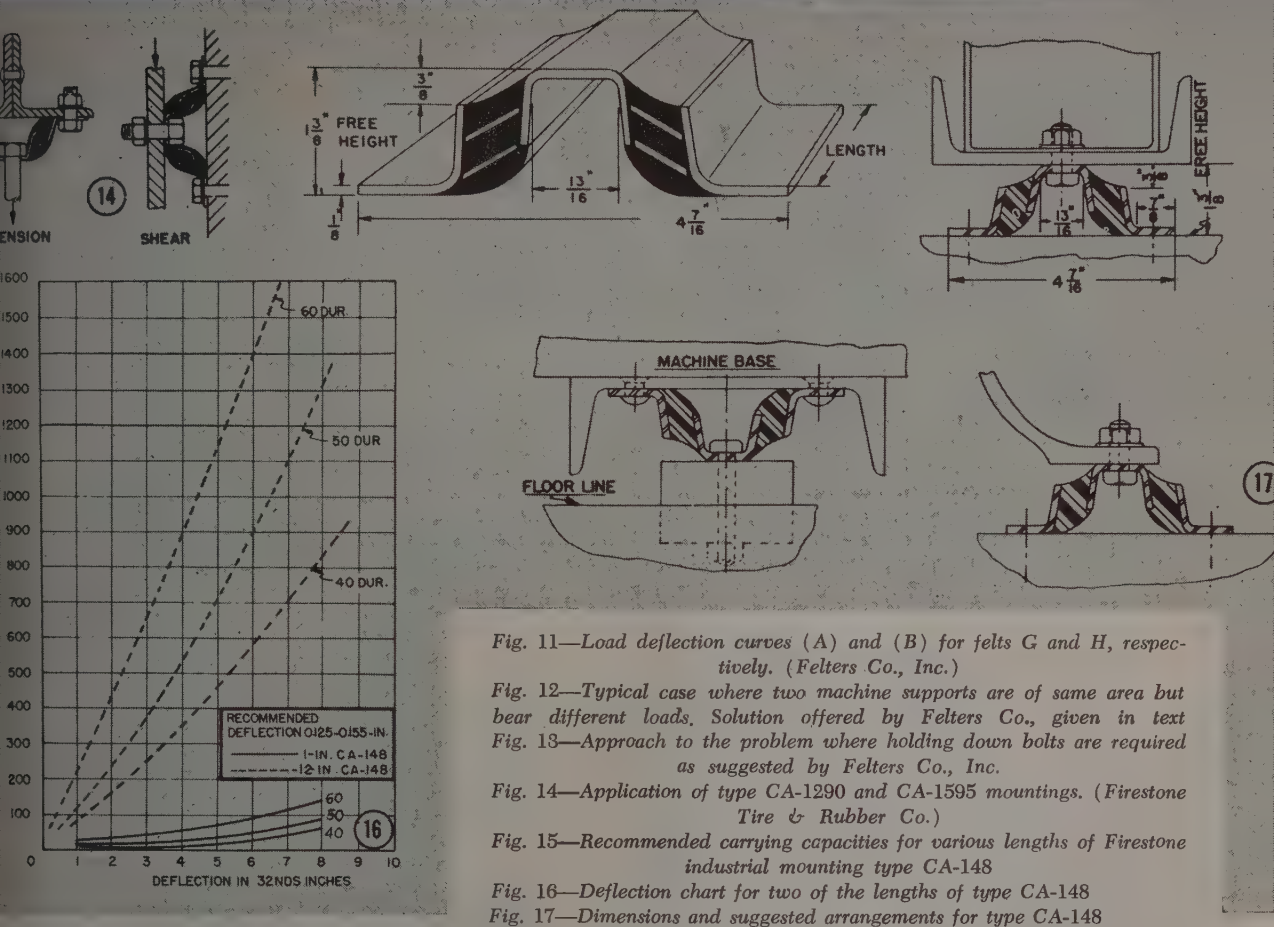


Fig. 11—Load deflection curves (A) and (B) for felts G and H, respectively. (Felters Co., Inc.)

Fig. 12—Typical case where two machine supports are of same area but bear different loads. Solution offered by Felters Co., given in text

Fig. 13—Approach to the problem where holding down bolts are required as suggested by Felters Co., Inc.

Fig. 14—Application of type CA-1290 and CA-1595 mountings. (Firestone Tire & Rubber Co.)

Fig. 15—Recommended carrying capacities for various lengths of Firestone industrial mounting type CA-148

Fig. 16—Deflection chart for two of the lengths of type CA-148

Fig. 17—Dimensions and suggested arrangements for type CA-148

VIOLENT stresses can be built up at the machine and its foundation by vibration originating in high speed productive machinery. These vibrations cause excessive wear and inefficient operation of the machine, they travel throughout the building to impair the precision of delicate instruments and fine machinery, and in addition cause fatigue in the people working under conditions of high frequency vibration.

Great attention is being given to the destructive forces of high frequency vibration because it has proven to be the cause of metal fatigue which in turn results in the breakage of machinery, machine parts, and shortens the life of buildings and other structures. In this series of articles, various standard mountings for the dampening of vibration are reviewed to indicate what is available for the control of this problem.

Felters Co., Inc. Boston, states laboratory and field tests have shown that felt is an excellent isolation material particularly for heavy loads. In the majority of heavy machines the area of the footing is comparatively small. Felt is adaptable to all large or small areas and does not require the installation of more material than is essential to efficient isolation. Field of heavy loading ranges from 10 to 45 psi; for the purpose of loadings from 10-45 psi, Felters' G and H felt in various thicknesses have been found most desirable. The load deflection curves for these two felts are shown in Figs. 11-A and B.

From experiments in loading the felts over an appreciable time and then measuring the "permanent set" of the material, it has been found that if G is loaded to 30 psi, its permanent set is not more than 6 per cent of its original thickness. For H loaded to 50 psi, the set is approximately 5 per cent of its original thickness. The compliance figures (measure of elasticity) start to decrease rapidly for G at 30 psi, and for H at 50 psi. The usual selection of load ranges is that G be used in the range from 10-20 psi, and H for loads 20 to 45 psi. Unisorb E felt has been established as standard for loadings above 45 lb and not higher than 65 psi.

Experience shows that where maximum loadings are approximated, other conditions such as the degree of vibration should be given consideration and that in many cases a recommendation should be for a loading slightly under the maximums shown in this report. Isolation will be improved with the thickness of the isolation. For example, for isolating a machine with a load on the footings of 40 psi, better isolation will be obtained with 1-in. H felt than with ½-in. H felt. It is not true, however, that the 1-in. felt will be twice as good as the ½-in. felt.

As a result of various tests, the following recommendations are made: First, use 1-in. thick G felt for loadings up to 20 psi. Second, use 1-in. H felt for loadings from 20 to 45 psi. Third, in cases where other considerations make the use of 1-in. material impossible, a smaller thickness than 1-in. can be used, but not less than ½-in.

It frequently happens that the supports of a machine are quite unequally loaded. In such cases the size of the isolator should be adjusted so that equal deflections are obtained at each support. A typical example will illustrate the procedure in such cases: In Fig. 12 the two machine supports are of the same area, the load on the left support being 9000 lb and load on the right, 4000 lb. The cross-

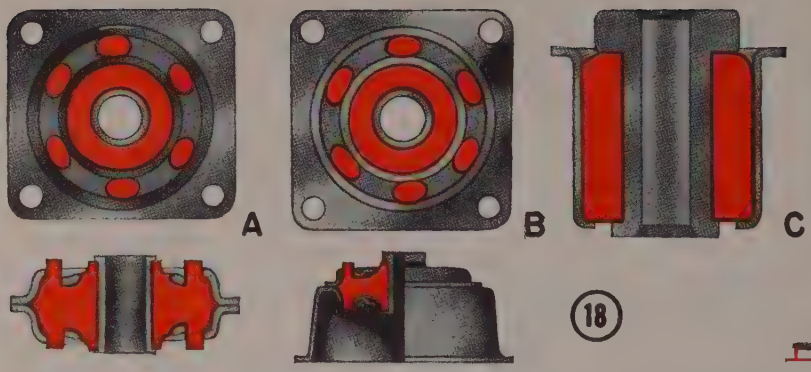


Fig. 18—Plate type mountings made by General Tire & Rubber Co. are supplied in five general shapes, shown here are (A) square, and (B) square cup. (C) is the well type of mounting

Fig. 19—Types 1 and 12 Goodrich isolators can be used in combinations

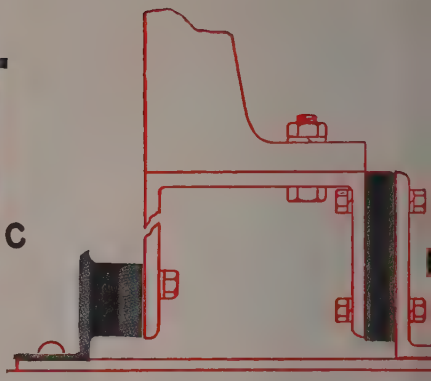


Fig. 20—Drop forge hammer in background is mounted on platform type of isolator made by General Tire & Rubber Co.

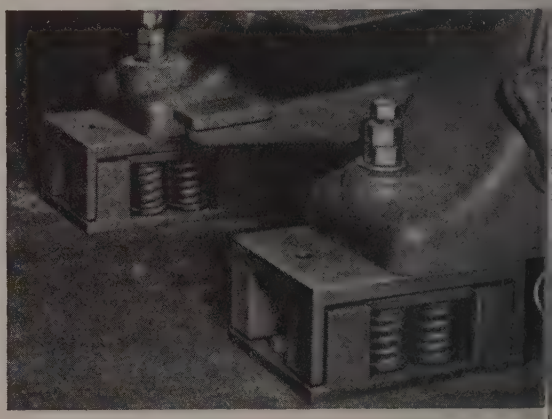
Fig. 21—Punch press on Korfund type SL isolators

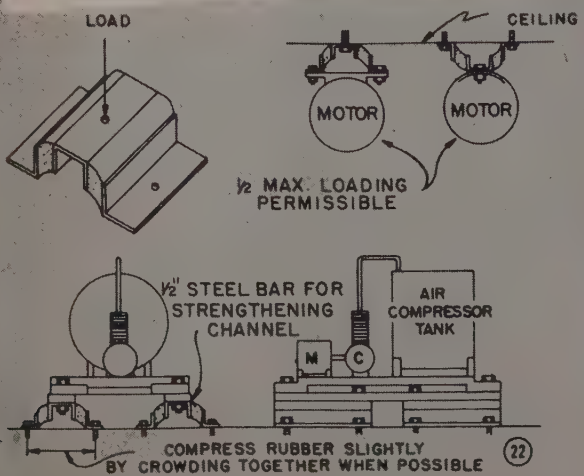
Fig. 22—Typical applications of type 10 isolator supplied by B. F. Goodrich

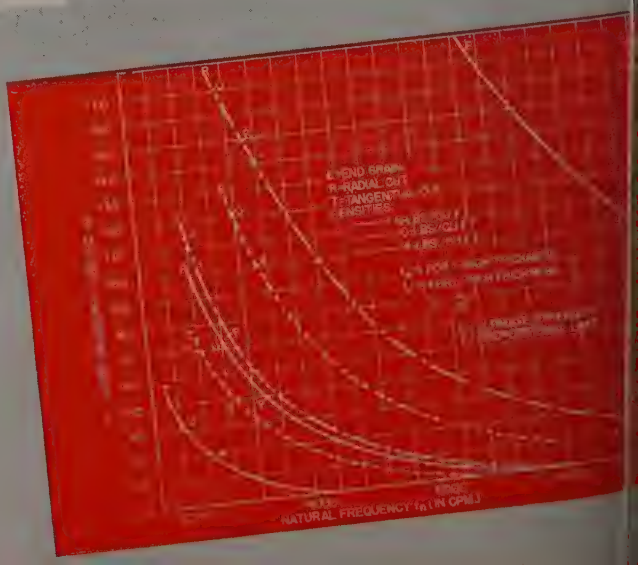
Fig. 23—Natural frequency curves for balsa in vibration isolation applications. Courtesy Chance Vought Aircraft Div., United Aircraft Corp.

Fig. 24—Drawing of concrete hammer foundation supported by Korfund type U isolators. Entire weight of machine and foundation is supported on springs

Fig. 25—A foundation suspension that provides all six degrees of freedom and therefore particularly suitable for installations on which forces may act in all directions (Courtesy Korfund Co., Inc.)







ional area of each support is 288 sq in. It is assumed t no holding down bolts are required. The loads per are inch on the supports are: Left support, 31 psi; t support, 14 psi.

Under the left support 1-in. thick H felt of 288 sq in. area sed. Deflection of this felt will be 0.142-in. under the . If 288 sq in. of H were used under the right support, deflection would be 0.095-in. In order to make the lection on the right support the same as on the left, cross-sectional area of the felt on the right is decreased as to get the same loading (31 psi) as on the left. Area felt to use under right support is 4000/31, or 130 sq in.

Assume that in the previous problem four holding down ts are required, located as shown in Fig. 13. Force rted by each bolt will be approximately 1500 lb. Con- ering the left support the total load on the 288 sq in. isolation will be 9000 + 3000, or 12,000 lb, giving a d of 42 psi. (Note that the isolator under the machine ports the load of the machine plus the bolt load.) dging is avoided by use of felt under the bolt head and elt washer between the bolt and the machine foot. e bolt load is 1500 lb and at 42 psi the necessary area 1-in. thick H felt is 1500/42, or 36 sq in. This can in the form of a washer 6-3/4 in. in diameter. When bolt is screwed down this felt washer should be eezed down 0.16-in. from its original 1-in. thickness.

Considering the right support, the two bolt loads are h 1500 lb. The load on the supporting isolation is 00 + 3000, or 7000 lb. Since the same loading (42 psi) lesired on the right support as on the left, the area of n. H felt under the right support should be 7000/42, 167 sq in. The washers under the bolt heads will be /4 in. in diameter, the same as for the left holding wn bolts.

Practical tests have shown that for the more complex chines, the maximum accelerations of the vibrations y be expected to be reduced by at least 50 per cent by of properly installed felt isolation. In the cases ere impact or high frequency vibrations are to be iso- ed, the reduction will be 70 per cent or more.

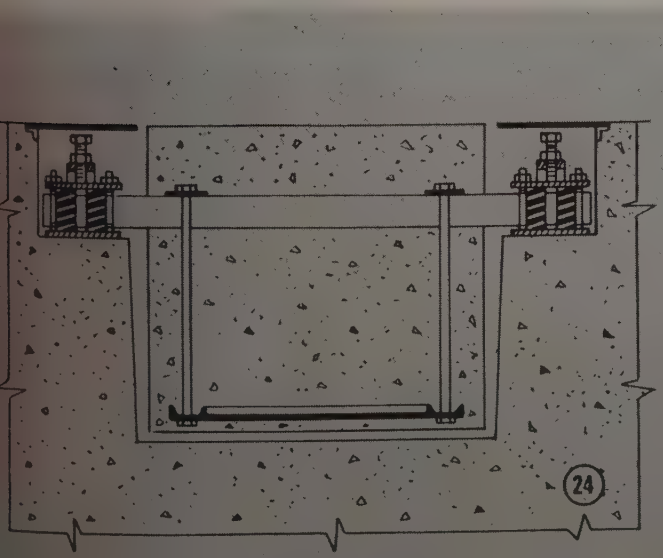
Firestone Industrial Products Co., division of Firestone e & Rubber Co., Akron, O., reports that it has devel- ed dampeners which cover a wider field of applications indicated by the load ratings listed in Table VIII. Chief features of the types CA-1290 and CA-1595 machinery mountings are an adequate factor of safety, ease of installation, and a wide range of carrying capacity.

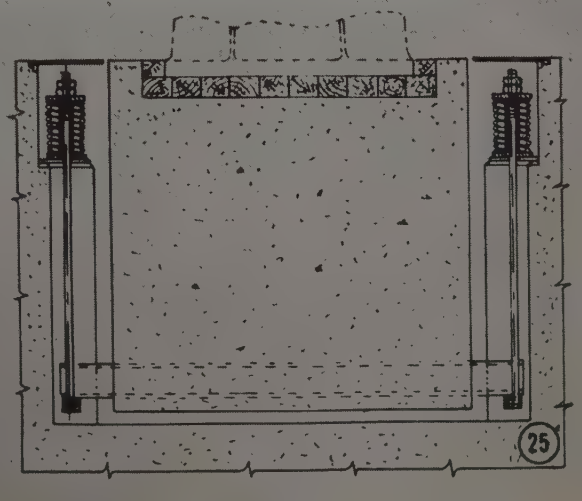
These mountings can be loaded from 200 lb per unit on the smaller sizes of 30 durometer to 2500 lb per unit on the larger sizes of 70 durometer. Installation is facilitated because the under side of the center insert is a hexagon socket, adapted to receive a standard hexagon nut, and it is provided with two ears which can be bent down with a cold chisel to retain this nut in place. This permits an ordinary bolt to be used as a cap screw. Interlocking inserts provide considerable stability in all directions in a horizontal plane, thus permitting a reasonable amount of side pull, as is required by belted drives. Also, because of the interlocking inserts, a factor of safety is available so that unforeseen dynamic forces will not completely rupture the part, and allow the machine to topple from its foundation.

Rubber hardnesses available for the mounting are 30, 35, 40, 50, 60, and 70 durometer. Sizes of center hold down bolts with which the CA-1290 mountings are provided, are 1/2, 5/8, and 3/4-in. U. S. Standard, while the CA-1595 fits either 3/8-in. USS or 1/2-in. SAE bolts. Dimensions of the flat oval flange for the CA-1290 and CA-1595 are, respectively, 3-7/8 in. short diameter, 6¼ in. long diameter, and 3¼ in. short diameter, 5-3/8 in. long diameter.

According to the company, the circulation of information on the load deflection characteristics of present synthetic stocks used for the mountings is not advisable due to the current technology in compounding of synthetics and the continuous program of improvements of formulas. However, with proper authorization special tests will be run and charts submitted on any specific part and of that particular production. It is suggested that help in making specific recommendations may be obtained by writing to the Mechanical Rubber Goods Engineering Department of the company, giving such details as load distribution, size of foundation or mounting lugs, and a description of the machines that are to be used.

The type CA-148 industrial vibration dampener is especially adapted to the absorption of relatively high frequency vibrations of small amplitude. Vibratory conditions of this kind occur with (*Please turn to Page* 120)





FLUX-INJECTION
Stainle

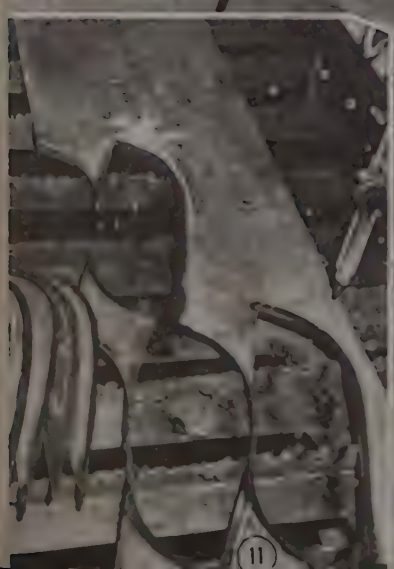
Fig. 10—Blades, Fig. 11, welded to outer flange of a assembly. Flange itself, of 20 cent nickel-clad steel was fl injection cut from a 12-ft dish and flanged head. Photo court International Nickel Co.

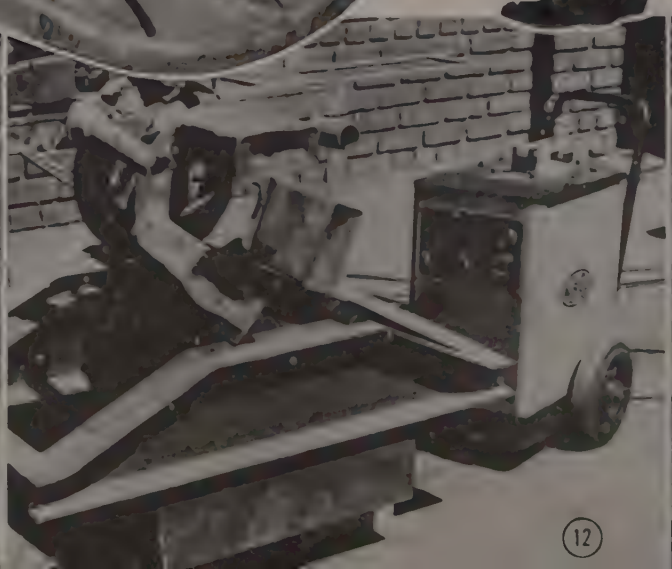
Fig. 11—Type 347 stainless bla for paper making machine are fl injection cut, using a standard O graph, at 11 ipm. This meth minimizes scrap, produces smo contours—ready for welding— finished blades. Photo court Smith & Caffrey Co.

Fig. 12—Heavy stainless steel c ing with three risers to be remo by the flux-injection metho

Fig. 13—Castings after removal risers. Note typical flat, sm pads left after machine flame c ting process

By G. E. BELLE
Steel Mill Specialis
Air Reduction Sales
New York





UTTING
teels

This final article on flame-cutting stainless discusses the carbide precipitation phenomenon and its behavior. It also stresses precautions in cutting shapes, risers and heavy steel-mill material

NFORTUNATELY there is another "quality" aspect lved when we hold the high chromium steels at ele- ed temperatures for any appreciable time, and that is degree to which the corrosion resisting quality of the y may be affected by carbide precipitation. This car- e problem is a common menace in welding, heat treat- and forging stainless steels, and must necessarily be ed in flame cutting them as well.

Carbide precipitation in stainless steel occurs when the y is held in the critical temperature zone between 800 1600° F, and particularly in the neighborhood of 0°, for any appreciable time. In this temperature zone, omium and carbon have a great affinity for each other, the free chromium and the carbon which is normally olid solution in the steel tend to precipitate in the n boundaries as chromium carbides. This "robbery" he free chromium upsets the corrosion resistance of the l in the heat-affected area to some, but not all, cor- ve agents. Steel so affected may remain resistant to ng acids but fail under attack by the same acid in a k solution—or may be impervious to a hot alkali but ted by a cold one, etc.

nce the carbide precipitation problem must be faced eating stainless into or above the critical range, the e factors that govern it, in welding, for example, ap- in flame cutting.

ne of these factors is the time-temperature relationship. As noted in Fig. 17, an appreciable time at 950° F has little effect on corrosion resistance, while a very short time at 1400° F causes more severe susceptibility. It is apparent, then, that the fastest possible transition through the critical range is necessary to hold carbide precipitation and resulting susceptibility to intergranular corrosion to a minimum. Ideally, a sufficiently rapid cooling would eliminate it entirely.

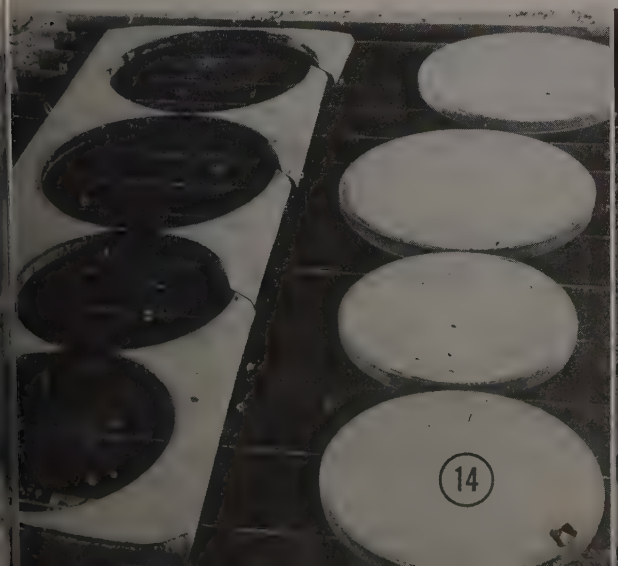
Another factor which governs carbide precipitation is the carbon content of the steel. As Fig. 18 indicates, the degree of susceptibility to intergranular corrosion after a given period of exposure to the critical temperature rises proportionately with the carbon content of the alloy up to 0.20 per cent carbon, at which point it levels off. Since almost all stainless alloys are under 0.20 per cent carbon, the almost directly proportional relationship on the lower part of the curve is the important one for practical purposes in flame cutting.

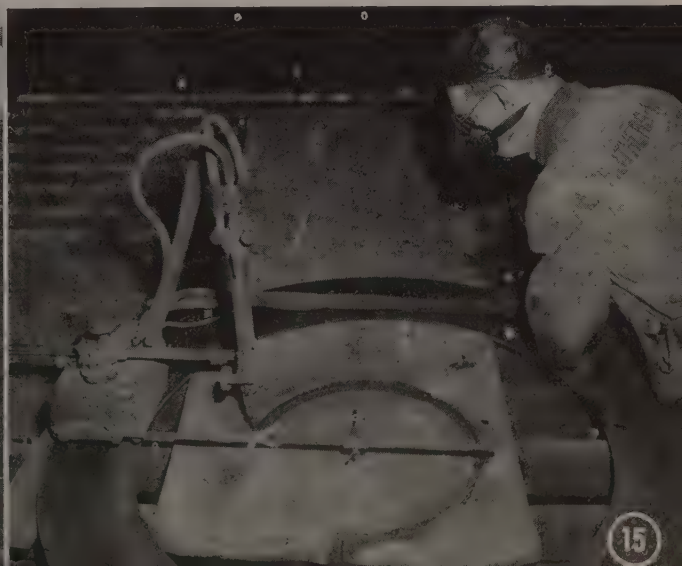
A third factor which has some control over the carbide precipitation effect on corrosion resistance is the relationship of chromium content to carbon content. The critical amount of chromium which must remain in the grains to prevent corrosion is in the vicinity of 11-12 per cent. Hence, a high carbon stainless of 12-13 per cent chromium would suffer seriously from a brief time at a critical temperature, while a material of 25 per cent chromium content would probably retain an excellent degree of corrosion resistance as a carbon content of 0.25 per cent or less.

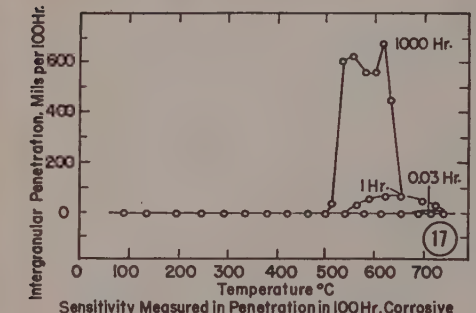
When it comes to flame cutting stainless steels, the behavior of the heat affected zone is governed largely by the low heat conductivity of these alloys, Fig. 19. This factor piles up the heat in a narrow band near the cut face—starting only a fraction of an inch from the cut face and only a fraction of an inch in width, beyond which the metal is unaffected.

Fig. 14—Fourteen of these disks, up to 30-in. diameter, are cut in time it took to produce four by other methods. Large pieces of scrap left intact after flame cutting are still useful material and, the disks, in one quick operation are ready for welding. Photos Figs. 14 and 15, courtesy Struthers Wells Corp.

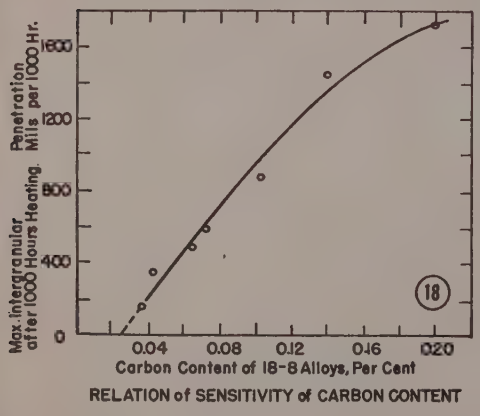
Fig. 15—Cutting disks from type 304 stainless slabs using flux-injection equipment and a standard Radiagraph



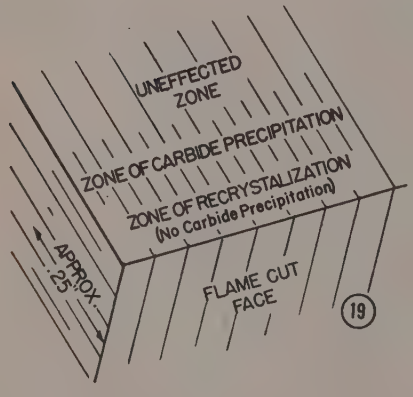




Sensitivity Measured in Penetration in 100 Hr. Corrosive Attack as Developed in 2 Min, 1 Hr. and 100 Hr. at a Series of Constant Temperatures.
Alloy Composition: Chromium 18.1, Nickel 8.9, Carbon 0.08%



RELATION of SENSITIVITY of CARBON CONTENT



Since these factors are variable and/or controllable it is possible to cope with the carbide precipitation problem in several ways. In the first place, there are many applications where a minor amount of carbide precipitation causes no appreciable loss of resistance to corrosion in the anticipated use—e.g., where concentrated acids are the only possible attacking agent—especially when the alloy content of the steel is high enough to leave a safe balance of chromium to protect the metal.

Then, when more freedom in choosing analysis is possible, selection of a low carbon high chromium alloy may eliminate the difficulty. By far, the best preventive solution to the problem is the use of a titanium or columbium type stabilized material. Since these two alloying elements have even greater affinity for carbon than chromium, they form their own harmless carbides, and leave the chromium free to protect the corrosion resistance of the stainless steel. Although these stabilized types are somewhat more costly, this material cost becomes relatively insignificant when it is compared to the great savings inherent in flame cutting.

When none of the preventive measures are available, other possibilities still remain as means of handling the carbide precipitation problem during or after flame cutting:

1. When the material is to be welded, the heat effects of cutting will be supplanted by those of the welding heat, adequate provision for which is usually made in good design practice for stain weldments.

2. Where the material is to be can be heat treated after cutting, carbide zone will be eliminated in operation.

3. Where a finish machining op tion is required, flame cutting can al the necessary amount of surplus m so affected area may be machined.

Sum of all these factors makes reasonable assumption that the carb precipitation problem will prove in mountable—or even very difficult- only rare instances, if proper consid tions are given to choice of mate and methods of working.

Probably through a reflection of pr ous failures, by other methods, to ach anything but a melting cut, there tendencies among inexperienced o ators to mishandle flux-injection cutt Among these are an inclination to a wastefully large amount of flux, slow a speed, and too high an oxy pressure. The table of recommen operating settings, Fig. 20, will vary actual application according to detail the job at hand, but not to any g extent, and it can be readily seen f the table that speeds, pressures, etc. a given tip size are fairly close to t for mild steel work, not on the s thickness but with the same size tip.

One factor which may tend to m the use of excessively large tips high pressures and flux feed sett seem necessary is failure to keep torch and tip clean of collected flux.

(*Please turn to Page* 104)

Fig. 16—*Since flux travels directly with the oxygen stream at same velocity, cutting riser in horizontal plane is as efficient with flux-injection as with standard flame cutting*

Fig. 17—*Results of laboratory test for loss of corrosion resistance in stainless steel after fixed times of exposure to temperature in the critical range*

Fig. 18—*Graph indicating relation of corrosion sensitivity after constant time of exposure to critical temperature to carbon content of stainless. Data in Figs.* 17 *and* 18 *courtesy Metal Progress and American Society for Metals*

Fig. 19—*Sketch shows behavior of heat-affected zone of stainless is governed largely by low heat conductivity of the alloys*

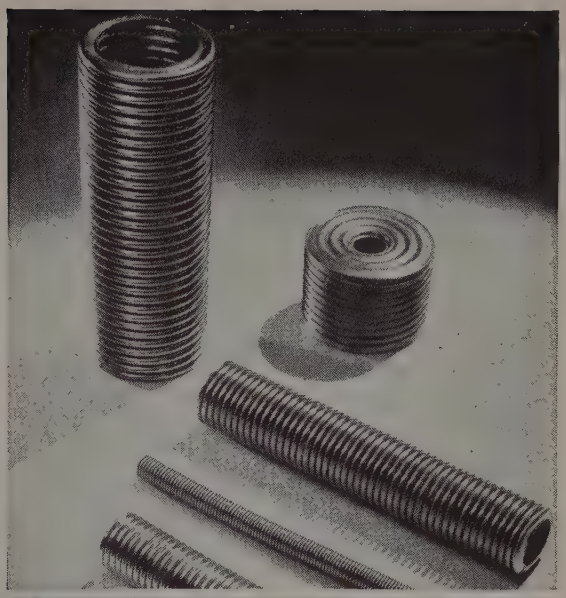
Fig. 20—*Table of suggested operating settings for flux-injection cutting*

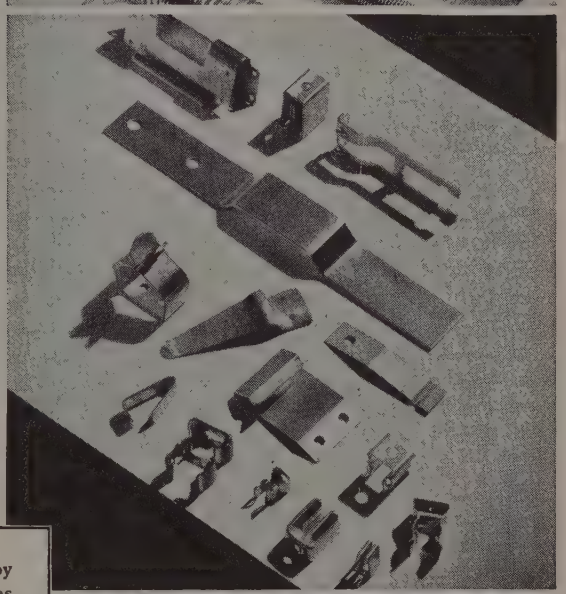
APPROXIMATE GUIDE FOR CUTTING CHROMIUM-NICKEL STAINLESS STEELS BY THE FLUX-INJECTION METHOD

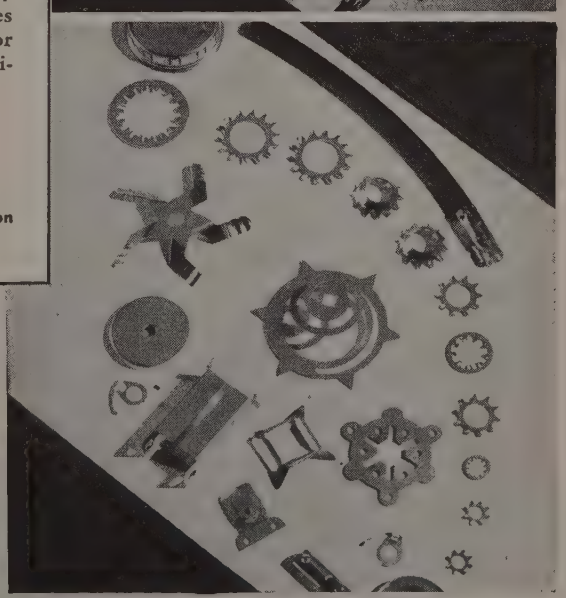
THICKNESS (inches)	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	7	8
* TIP SIZE	2	2	2	3	4	4	5	5	6	7	7	8	8	8	9
CUTTING OXYGEN (p.s.i.)	55	65	75	65	55	65	55	60	65	75	85	85	90	95	105
** SPEED (in./min.)	11	9	9	8	9	9	9	8	7	6	5	4	4	3	3

* Airco style 138 or style 164 cutting tips.
** Speeds given are for chrome-nickel steels with hot mill finish. For clean chrome-nickel plate and for straight chrome types speeds increase 25–75%

FOR PHOSPHOR BRONZES COME TO REVERE







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Seen and Heard in the

Machinery Field

By GUY HUBBARD
Machine Tool Editor

HAMMER PHILOSOPHERS: The average man whose interests primarily lie in metalworking by machine tools, is apt to have rather dim ideas about the ancient art of metalworking by forging. Mention it casually, and I venture to say that the picture which immediately will flash into his mind will be that of Vulcan, Thor, Tubal Cain, the biblical blacksmith in the seat to the right of the throne of King Solomon, or possibly a village smithy under a spreading chestnut tree.

I was somewhat that way myself until I went to Chambersburg, Pa., a few days ago and had my thinking readjusted in line with the times by those capable "hammer philosophers," the two Eugene Clarkes (Sr. and Jr.), R. E. W. Harrison and Harry Showalter. A full day with them proved to me that there is a whole lot more to this modern power hammer business than a lot of cast iron vitalized to "pack a punch" measured in thousands of foot-pounds.

The basic difference between the thinking of these hammer men and that of machine tool men is that while the latter cogitate on "how can we *remove* the most metal in the form of chips in the least time," the hammer engineers cogitate on "how can we *move* the most metal in the least time so that only a minimum amount of it subsequently will have to be *removed* in the form of chips." In other words, these hammer men at heart are "metal conservationists."

And another thing, where the typical machine tool man is concerned mainly with the surface of his work, these hammer engineers constantly are thinking—and literally thinking "deeply"—about what goes on below the surface. They do, of course, strive to get good surface finish, but at the same time they strive to "flow" the fibers of the metal around bends, radii, pockets and holes instead of chopping them off—thus attaining the most strength with the least metal. In this respect they not only are conservationists but also "safety engineers" in the best sense of that term. "Think of us," they said, "when you are up in the air."

Like machine tool engineers, I found the hammer men at Chambersburg Engineering Co. to be dealing with the problem of high labor rates by minimizing "idle time" in the cycle of operations of their machines—thus getting more production per expensive operating minutes. In the case of gravity fall drop hammers, they have achieved this by "shooting" the rams back to ready-to-drop position by means of "one-way" steam or air cylinders, instead of lifting them by squeezing a board between revolving rollers.

Not only does this quick lift enable the hammer to strike approximately 20 per cent more blows in a given length of time—making these hammer philosophers conservationists of valuable time as well as valuable metals—but also the system permits the use of much heavier rams (over 5000 lb) than previously have been practical on gravity drop hammers. The economic significance of a hammer which delivers more blows per minute and at the same time completes forgings in fewer blows, is self-evident in this day and age when mechanical power is so cheap and man power so costly.

Improved hammers and other forging machinery, and improved die forging practice, undoubtedly will in many cases shift the emphasis in metalcutting from the "roughing out" of work from chunks of metal, to precision finishing of parts already brought closely to size by the forging process.

This will enable precision machines to concentrate on the work they do best, which is swift, uninterrupted machining to modern exacting standards of size and surface finish. Handling, holding and magazining of work will be greatly simplified because of lightness and accuracy of the preformed "blanks." By the same token, chip disposal will cease to be a major machine tool problem.

At the same time, the forging industry must count heavily on the machine tool industry to break the bottleneck in die making, by developing faster, more complete and cheaper methods for mechanical cutting, finishing and multiple reproduction of forging dies.

Although basic thinking involved is quite different, my conclusion is that there actually is no conflict between forging and machining. The success of each depends on the other. Both are co-operating toward this all-important end result: "More and better and *cheaper* things for more people—who in turn will have jobs at good pay making, marketing and servicing those things."

TRIGGER-QUICK TOOLS: Of late years there have been great increases in the horsepower of threading machines, in their speed of operation, in required accuracy of their products, and in the demands of users for convenience and dependability of their operation. To a large extent these new conditions and expectations have been put right up to the threading tool design engineers and tool engineers—these tools literally being the "spear heads" upon which the brunt of the service falls.

Considering that an opening die head or a collapsing tap must be almost as full of holes as a Swiss cheese, and must at the same time be of minimum size, of maximum strength, tremendously "quick-on-the-trigger" and with long life of accuracy under trying conditions of operation—I am convinced that these tools embody more design brain power and tool making know-how per pound than almost anything in the machine tool industry.

This was driven home to me on the 4th of February—which day I spent as a guest of C. N. Kirkpatrick and his associates at the Landis Machine Co. in Waynesboro, Pa. Seldom have I observed more "compact" designing; more care in selection and treatment of alloy steels; more ingenious tooling for precision "overall" machining of complicated parts; and more complete gaging setups to insure strict interchangeability of every one of these parts. I used to think that gunsmiths were "tops" in that sort of thing. Now I am handing the palm to threading toolsmiths.

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Engineering News at a Glance

FURNISHED ITS OWN STEEL: Since large steel makers generally did not like to bother with small orders of watch and clock factories, the Junghans firm at Schramberg, Germany, operated its own spring and wire factory, according to a report made to the Office of Technical Services, Washington. Mainsprings for watches and clocks are made by rolling wire flat instead of splitting steel strips. The chromium-nickel rolls used for the rolling are about 5 in. long and 4 in. diameter. After rolling, round edges of the strips are removed by passing them through a series of grinding wheels. Strips then are polished by running them through an abrasive compound between two sets of opposed steel wire brushes. Mainsprings as thin as 0.05 mm and 0.5 cm wide are made in this manner.

TRIMMING WEIGHT: An entirely new construction, Westinghouse Electric Corp., Pittsburgh, reveals, reduces total weight of marine gear cases roughly by 10 per cent. Instead of a heavy welded or fabricated stress-carrying housing, the gear case now consists of a skeleton of steel beams to carry all bearing loads. This skeleton is encased in a light-metal housing which serves to house the oil satisfactorily, and to enclose rotating members.

CONCERNS ALL ENGINEERING: Reaching into every important engineering field, the list of 864 standards recently approved and made public by American Standards Association, New York, includes many of those developed under war procedure and approved for peacetime use. It includes definitions of technical terms, specifications for metals and other materials, methods of work and tests for finished products. According to P. G. Agnew, vice president of the association, some of the standards deal with public and industrial safety. Many of them are of particular interest to lawyers, legislators and public regulatory authorities because they form the basis for city, state and federal regulations.

PINT-SIZE ENGINE: Evidence of the extent careful design and adherence to standard engineering and metallurgical principles have crept into the motive power end of building small model airplanes, is supplied by a 1-cylinder engine developed by the Engine Division of Bone Tool & Gauge Co., Detroit. Designed to provide maximum power for its size—and minimum weight—it has a bore of 0.9375-in., a stroke of 0.875-in. and a displacement of 0.604 cu in. To assure light weight and rigidity cylinder and housing are integral. A Ni-Resist cylinder sleeve is used to retard wear and corrosion, because its thermal expansion coefficient corresponds closely to that of the aluminum alloy cylinder. The nickel-copper-chromium alloy liners are cast in the foundry of Baker-Perkins Co. of Saginaw, Mich.

READY FOR ORDERS: Dehumidification machines, used widely in the Navy's fleet preservation program, known as Operation Zipper, are now available to industrial and commercial users, it was learned from Pittsburgh Lectrodryer Corp. in Pittsburgh. The firm recently completed the major portion of its Navy contracts and cleared its production lines for nongovernment orders, George L. Simpson, vice president and general manager of the organization, revealed. Prewar equipment found its widest use in metallurgical and chemical fields and in the oil and gas industry. However, successful use of the improved machines in the fleet program opened new and potentially greater markets, according to the company's research department. It solves problems of any number of industrial and commercial organizations confronted with the preservation of materials and equipment held in storage.

TRAIN OF TOMORROW: "Budding" in the fall of 1944, the General Motors version of the train of the future, an experimental project to try out advanced ideas for improving railroad travel, will "bloom" into reality this spring when the new train will be unveiled to the public in major cities across the country. Advanced new materials and unique construction are embodied in the cars of the train which consists of a diner, chair car, observation lounge car and sleeper, pulled by a GM diesel locomotive. The cars, which are being built by Pullman-Standard Mfg. Co., collaborating with Electro-Motive Division engineers and GM styling experts, will have the Astra dome, a glass-enclosed upper level compartment located in the roof, seating as many as 24 passengers. Interiors will permit much more flexibility of movement, due to new planning of seating and sleeping accommodations. In discussing the "train of tomorrow," C. E. Wilson, GM president, stated that although the corporation is vitally interested in the entire field of transportation, it has no intention of going into the railroad car business. Decision to undertake the project was based partly on the urging some of the 350 officials of more than class one railroads, after they were sho a model of the train early in 1945.

DEVELOPS SEALING PROCESS: H metic Seal Products Co., Newark, N. reports the perfection of a method producing hermetic seals in a combinat of new metal and glass for unrestric use. At a 75 per cent saving in materi an unlimited variety of shapes in multi headers, with as many terminals as sired molded into a cover unit, can turned out with the new process. Acc ing to the company, the headers hav resistance of over 10,000 megohms tween body and terminals or betw terminals. They have a permanent che cal bond between metal and glass and capable of withstanding shock of hot dipping to facilitate soldering.

MECHANICAL EYE: Leaks in filled equipment so small that they virtually undetectable by ordinary m can be discovered instantly by the of mass spectrometer, Prof. T. I. Ta of Columbia University, pointed recently to the New York section of American Chemical Society. This done by filling the equipment to tested with helium gas, and placin small spectrometer at the joints wh are suspected of leaking. The spectrometer can be applied to al any chemical process involving g or substances which can be gasi The professor said that development devices that continuously record spec metric measurements may make it po ble for the mass spectrometer to func as the mechanical eye of a mechan brain that will control automatic many industrial processes.

NO BLINKING LIGHTS: Modern sistance welding has developed to a point that even in places like De and Chicago there is frequently enough electric power supply to ha the terrific, even if instantaneous po demands, Arthur C. Johnson of gressive Welder Co., told members the American Institute of Electr Engineers recently in New York. ordinary welder, operating on alterna current, can easily make the lights b throughout such a town as Connorsv Ind., he said. The solution to the po problem is turning out to be wel machines in which electrical energ gradually stored up between welds, suddenly released when the energ needed to make the weld.

Record Attendance Expected at Fifth

WESTERN METAL CONGRESS AND EXPOSITION . . .

West coast show sponsored by American Society for Metals to draw over 40,000 industrial executives to Oakland, Calif.. Civic Auditoriums for six days beginning March 22. One hundred seventy-two companies to exhibit products

CURRENT interest in the progress made in alloys, metals manufacturing and fabricating equipment and other phases of the metals industries is indicated by more than 40,000 scientists, engineers and executives expected to attend the fifth Western Metal Congress and Exposition on the West Coast. Scheduled for 6 days, beginning Saturday, March 22, the exposition will be housed in the two Oakland Civic Auditoriums in the San Francisco-Oakland Golden Gate area.

Further evidence of the high interest in the meeting is the fact that more manufacturers of metal products are exhibiting in 1947 than ever before in a western show. In addition, technical programs already completed reveal more than 75 papers, lecture courses and "round table" discussions will be included.

According to W. H. Eisenman, managing director of the exposition, sixteen western divisions of the technical societies are actively co-operating in the program and other activities scheduled. Meetings will begin at 9 a. m. daily, and end at 5 p. m. The show will end Thursday, March 27. Hotel rooms may be obtained by contacting Howard S. Sipe, manager, Housing Bureau, Convention and Tourist Department, 417 Fourteenth street, Oakland.

American Society for Metals Technical Program

Monday Morning, March 24

9:00-9:55—Principles of Heat Treatment of Steels, E. E. Thum, editor, *Metal Progress,* Cleveland.

10:00-10:55—Electron Microscopy, David Harker, General Electric Co., Schenectady, N. Y.

10:00-10:55 — Tool Steels (discussion), Norman Stotz, Braeburn Alloy Steel Corp., Braeburn, Pa.

11:00-11:55 — Interpretation of Creep and Stress-Rupture Data, F. B. Foley, Midvale Co., Philadelphia.

11:00-11:55 — Physical Chemistry of Steelmaking, John Chipman, Massachusetts Institute of Technology, Cambridge, Mass.

Monday Afternoon

2:00-2:55—Physical Metallurgy of Stainless Steels, V. N. Krivobok, International Nickel Co., New York.

2:00-2:55—Effect of Residual Stresses on the Fatigue Strength of Metals, John O. Almen, General Motors Corp.

3:00-3:55 — Physical Metallurgy of Aluminum Alloys, E. H. Dix Jr., Aluminum Co. of America, New Kensington, Pa.

3:00-3:55—Theory of Corrosion, R. M. Burns, Bell Telephone Laboratories, Murry Hill, N. J.

4:00-4:55—Industrial Growth of the West, F. T. Letchfield, Wells Fargo Bank & Union Trust Co., San Francisco.

Monday Evening

Golden Gate Lecture

8:00-8:55—Correlation of Recent Data on Hardenability, A. L. Boegehold, president, American Society for Metals, and head, metallurgical department, Research Laboratories Division, General Motors Corp., Detroit.

Tuesday Morning, March 25

9:00-9:55—Principles of Heat Treatment of Steels, E. E. Thum.

10:00-10:55—Fabrication of the Brasses, Harry P. Croft, Chase Brass & Copper Co., Waterbury, Conn.

10:00-10:55 — Tool Steels (discussion), William H. Wills, Allegheny Ludlum Steel Corp., Brackenridge, Pa.

11:00-11:55 — Interpretation of Creep and Stress Rupture Data, (Lecture No. 2), Francis B. Foley.

11:00-11:55 — Physical Chemistry of Steelmaking, John Chipman.

Tuesday Afternoon

2:00-2:55—Physical Metallurgy of Stainless Steels (Lecture No. 2), V. N. Krivobok.

2:00-2:55—Effect of Residual Stresses on the Fatigue Strength of Metals (Lecture No. 2), John O. Almen.

3:00-3:55—Physical Metallurgy of Aluminum Alloys (Lecture No. 2), E. H. Dix Jr.

3:00-3:55—Preparation of Surfaces for Protective Coatings, James R. Ewing, Solventol Chemical Products Inc., Detroit.

4:00-4:55 — Nondestructive Testing by Means of the Supersonic Reflectoscope, Floyd Firestone, consulting physicist.

4:00-4:55 — New Approaches in Heat Treatment, Glen Riegel, Caterpillar Tractor Co., Peoria, Ill.

Wednesday Morning, March 26

9:00-9:55—Hardenability of Steels, W. E. Jominy, Chrysler Corp., Detroit.

10:00-10:55—Tool Materials and Their Application, A. H. d'Arcambal, Pratt & Whitney Division, Hartford, Conn.

10:00-10:55 — Controlled Atmospheres, H. M. Heyn, Surface Combustion Co., Toledo, O.

11:00-11:55 — Alloys for Ultra High-Temperature Service, F. S. Badger, Haynes Stellite Co., Kokomo, Ind.

11:00-11:55—Steel Melting Practice, C. H. Herty Jr., Bethlehem Steel Co., Bethlehem, Pa.

Wednesday Afternoon

2:00-2:55—High Chromium Irons, H. D. Newell, Babcock & Wilcox Tube Co., Beaver Falls, Pa.

2:00-2:55—Plasticity of Metals, John H. Hollomon, General Electric Co., Schenectady, N. Y.

3:00-3:55—Physical Metallurgy of Aluminum Alloys (Lecture No. 3), E. H. Dix Jr.

3:00-3:55 — Protective Coatings, R. M. Burns, Bell Telephone Laboratories.

4:00-4:55—X-Ray Diffraction, Kent R. Van Horn, Aluminum Co. of America.

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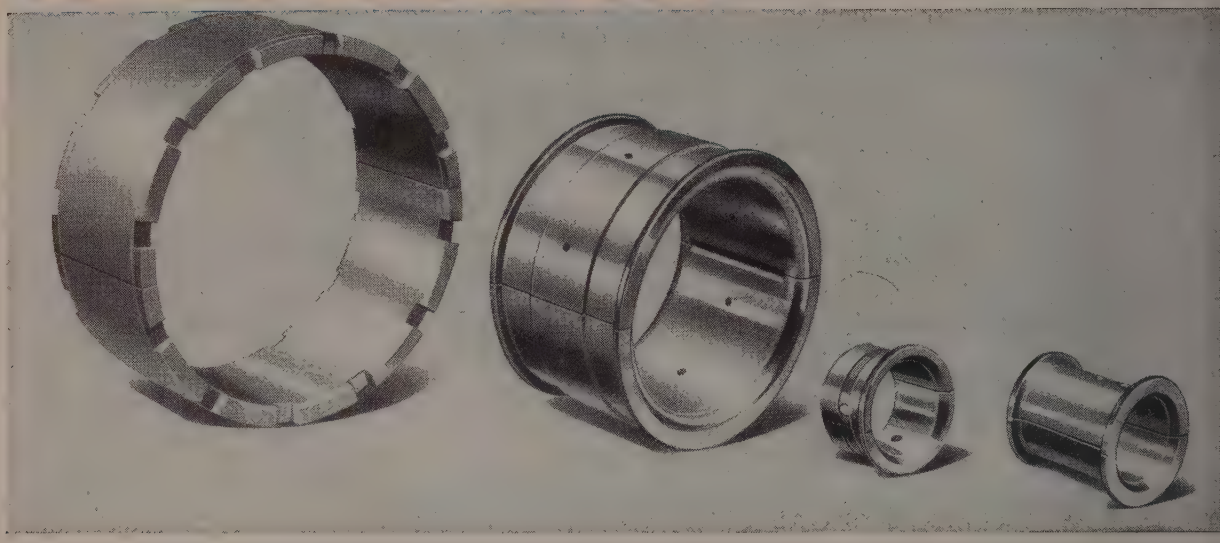

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Thursday Morning, March 27

:00-9:55—**Research in Carbon Steels,** Harold K. Work, Jones & Laughlin Steel Corp., Pittsburgh.
0:00-10:55 — **The Heat Treatment of Precision Cutting Tools,** A. H. d'Arcambal, Pratt & Whitney Division.
1:00-11:55—**Alloys for Low-Temperature Service,** S. L. Hoyt, Battelle Memorial Institute, Columbus, O.

Thursday Afternoon

:00-2:55 — **Stainless Steels in Aircraft,** Given Brewer, consulting metallurgist.
2:00-2:55—Fracture of Metals, John H. Hollomon, General Electric Co., Schenectady, N. Y.
3:00-3:55 — Recent Developments in Magnesium Alloys, J. C. McDonald, Dow Chemical Co., Midland, Mich.
3:00-3:55—Recent Advances in Powder Metallurgy, Earl R. Parker, University of California, Berkeley, Calif.
4:00-4:55—Mechanical Testing, Arthur E. Focke, Diamond Chain & Mfg. Co., Indianapolis.
4:00-4:55—Electron Microscope, Charles Banca, Radio Corp. of America, Camden, N. J.

American Foundrymen's Association Program

Monday Noon, March 24

Luncheon, Hotel Leamington, Oakland

Chairman — Richard Vosbrink, president, Northern Calif. chapter, A.F.A.
The Future for Industry in the West, Don Follet, Oakland Chamber of Commerce.

Monday Afternoon

Chairman—Leon Cameto, Production Foundry Co.
Co-Chairman—James Lynch Jr., Lynch Brass & Aluminum Foundry, Oakland.
:00-3:25 — **Aluminum Castings,** Roy Paine, Aluminum Co. of America, New Kensington, Pa.
Chairman—Fred A. Mainzer, Pacific Brass Foundry, San Francisco.
Co-Chairman — Herbert E. Eggerts, Berkeley Brass Foundry, Berkeley, Calif.
3:30-5:00—**Brass and Bronze Castings,** George Dreher, national director, A.F.A.

Tuesday Afternoon, March 25

Chairman—Harry Bossi, H. C. Macaulay Foundry Co., Berkeley, Calif.
Co-Chairman — Hugh Prior, Enterprise Engineering & Foundry, San Francisco.
2:00-3:25 **Core Blowing,** L. D. Pridmore, Int'l. Molding Machine Co., La Grange Park, Ill.
Chairman—Norman E. Schlegel, Vulcan Foundry Co., Oakland, Calif.
Co-Chairman — George Stewart, Pacific Brass Foundry Co., San Francisco.
3:00-5:00—Foundry Sands, Sand Committee of Northern California Chapter, A.F.A. (Harold E. Henderson—Iron; James L. Francis—Steel; George Stewart—Nonferrous.)

Wednesday Afternoon, March 26

Chairman — Ray A. Wilson, Pacific Steel Castings Co., Berkeley, Calif.
Co-Chairman—John A. Watson, General Metals Corp., Oakland, Calif.
2:00-3.25—Steel Castings, Speaker to be announced.
Chairman — Robert Gregg, Reliance Regulator Corp., Alhambra, Calif.
Co-Chairman—A. M. Ondreyco, Vulcan Foundry Co., Oakland, Calif.
3:30-5:00—Iron—Cupola Melting, J. T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala.

Thursday Afternoon, March 27

Chairman—Ed. M. Welch, American Manganese Steel Co., Oakland, Calif.
Co-Chairman — Charles Hoehn Jr. Enterprise Engine & Foundry, San Francisco.
2:00-3:25—Safety Code for Foundries, Speaker to be announced.
Chairman — R. A. Johnson, General Metals Corp., Oakland, Calif.
3:00-5:00 — Standards, Inspection, and Repair of Aircraft Quality Castings, T. E. Piper, Northrup Aircraft Inc., Burbank, Calif.

American Welding Society Program

Monday Morning, March 24

Three Consecutive Sessions

Chairman—Mark Haines, San Francisco chapter, A.W.S.
Vice-Chairman — T. S. Sholes, Spokane chapter, A.W.S.
9:00-9:55—**Hard Facing—a Major Factor in Manufacture and Maintenance,** H. W. Sharp, Stoody Corp., Whittier.
10:00-10:55 — **Welding Stainless and Heat Resisting Alloys,** T. R. Lichtenwalter, Republic Steel Corp.
11:00-11:55 — **Oxy-Acetylene Pressure Welding,** E. R. Proctor, Menasco Mfg. Co., San Francisco.

Monday Noon

A.W.S. *Official Convention Luncheon San Francisco Chapter*

Master of Ceremonies—Charles Smith, Linde Air Products Co., New York.
Welcoming Remarks, Carl J. Eastman, president, San Francisco Chamber of Commerce.
Welcoming Remarks, James H. L'Hommedieu, president, Oakland Chamber of Commerce.
The Future of Welding in the West, Lee Delhi, national A.W.S. president.
Presentation of Lincoln Gold Medal Award to H. E. Kennedy, Albany, Calif.

Tuesday Morning, March 25

Three Consecutive Sessions on Resistance Welding

Chairman—Mark Cassimus, Sullivan-Cassimus Co., San Francisco.
Vice-Chairman—T. E. Piper, Northrup Aircraft, Inc., Burbank, Calif.
9:00-9:55 — **The Future of Resistance Welding,** M. S. Clark, Federal Machine & Welder Co., Warren, O.
10:00-10:55—**Resistance Welding Applications,** J. H. Cooper, Taylor-Winfield Corp., Warren, O.
11:00-11:55 — **Possibilities of Electronic Control,** G. W. Garmon, General Electric Co., Schenectady, N. Y.

Tuesday Afternoon

Two Consecutive Sessions

Chairman — Elmer Gunette, Tacoma section, A.W.S.
Vice-Chairman — Ray Gann, Rheem Mfg Co., San Francisco.
2:00-2:55 **Electrode Alloys for Resistance Welders,** G. N. Sieger, S.M.S. Corp., Detroit.
3:00-3:55 — **Inert Gas Shielded Arc Welding,** T. E. Piper, Northrup Aircraft Inc., Burbank, Calif.

Wednesday Morning, March 26

Chairman — David Bisbee, Los Angeles section, A.W.S.

Vice-Chairman—Chas. Smith, Linde Air Products Co., New York.
9:00-9:55—**Submerged Arc Welding in Light Gage Metals,** H. E. Kennedy, Albany, Calif.
10:00-10:55—**Thermit Welding of Rails and Large Castings,** J. B. Tinnon, Metal & Thermit Corp., New York.
11:00-11:55 — **Welding and Fabricating of Heavy Alloys for High-Temperature and Corrosion Applications,** Charles G. Chisholm, Haynes Stellite Co., Kokomo, Ind.

Wednesday Afternoon

Chairman — Paul Kullberg, Portland section, A.W.S.
Vice-Chairman — G. S. Schaller, Puget Sound section, A.W.S.
2:00-2:55—**Modernized Fabrication,** Earl Griffeth, Wooldridge Mfg. Co., Sunnyvale, Calif.
3:00-3:55—**The Co-ordinated Developments in A.C. Welders and Electrodes,** C. P. Croco, Westinghouse Electric Corp., Pittsburgh.

Thursday Morning, March 27

Chairman—L. P. Henderson, Lincoln Electric Co., Cleveland.
Vice-Chairman—Walter Danton, San Francisco Naval Dry Docks.
9:00-9:55—**Modern Design in Structural Welding,** LaMotte Grover, Air Reduction Sales Co., New York.
10:00-10:55—**Low Temperature Brazing,** Herman Folgner, Handy & Harman, New York.

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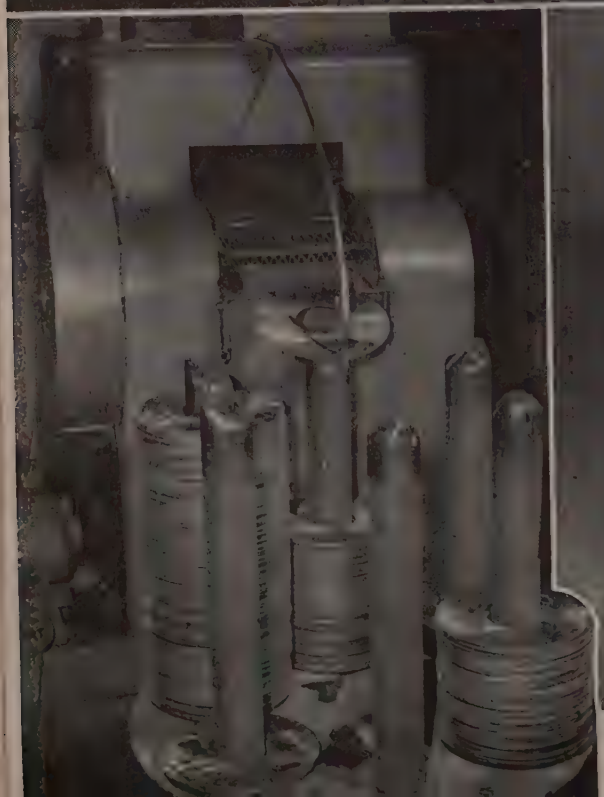
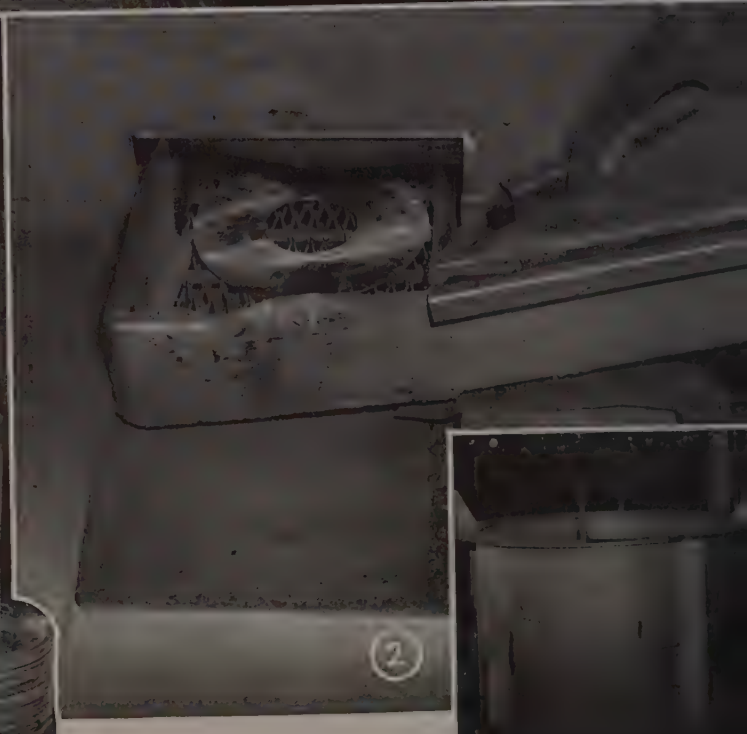
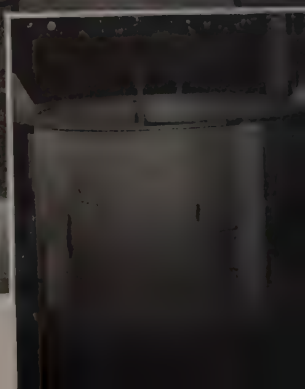






By HERBERT CHASE

'PRINGS

WHEN Buick adopted the corrugated disk type of clutch spring, formerly made by another General Motors division, it became necessary to develop an entirely new manufacturing setup. In this, every stage of production is under exacting control. Moreover, to insure uniformity and certainty of prolonged and satisfactory service, provision for careful tests of every spring was made a part of the manufacturing setup here described.

In this setup, first class metallurgical practice goes hand in hand with fast but well controlled production procedures. As a result, the product not only attains a high and uniform quality but is turned out at moderate cost.

At first glance, the radially corrugated disk spring may be judged to be a rather simple product to manufacture, but when the high stresses imposed and the exacting requirements to be met are studied, the problems are found to be more difficult than anticipated. Defects that would be of no consequence in most ordinary stampings may start a failure in a part that is subjected to severe working, hardened, heavily loaded and frequently flexed.

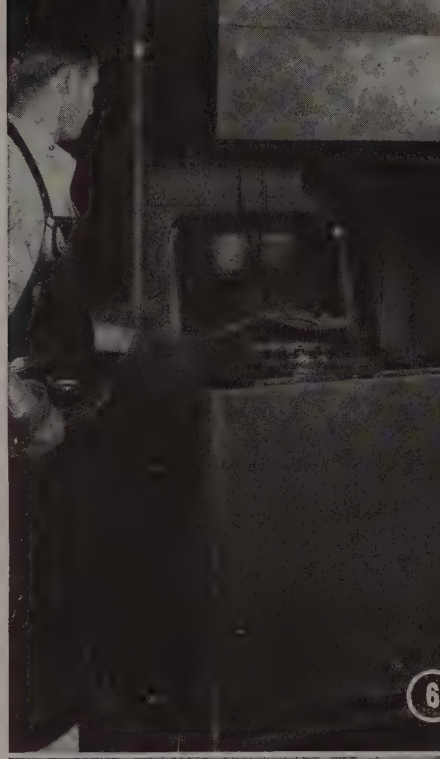
For these reasons, unusual care is exercised and surface and other treatments are such that the chances of failure in service are reduced to an absolute minimum. Material chosen is fine grain cross-rolled 1065 annealed drawing steel sheet which comes within 0.068 and 0.073-in. thickness limits.

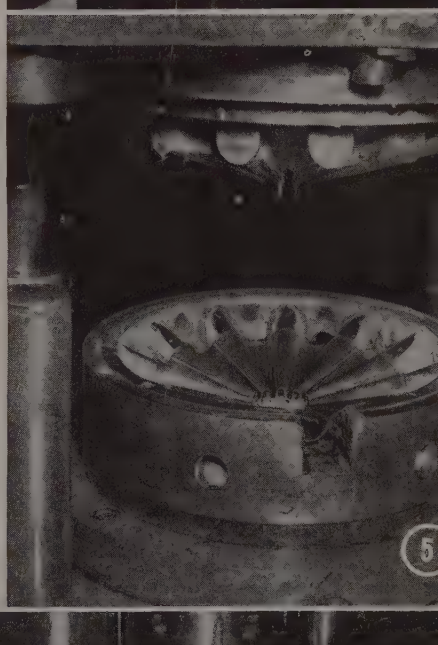
The initial production operation is to blank the stock into disks having a central hole, in a conventional blanking die. Blanks then go to Gardner grinders, one of which is shown in Fig. 1, with the fixture cover removed. Each disk is loaded so that its outer diameter rests in two grooved rollers against which it is held by an idler that presses against the inner diameter. Next, the disk is advanced between a pair of grinding wheels that are then hydraulically pressed against the disk as it rotates slowly and is ground to a thickness of 0.056-in.

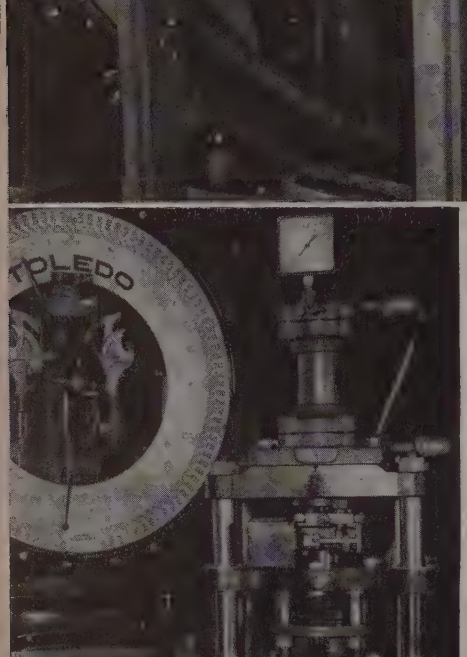
Only enough stock is removed to insure smooth surfaces on both sides of the blank. The wheel that moves axially is fed to a stop and, by observing meters connected in the circuit of the motor driving the wheels, the operator can tell when grinding has reduced the disk to specified thickness.

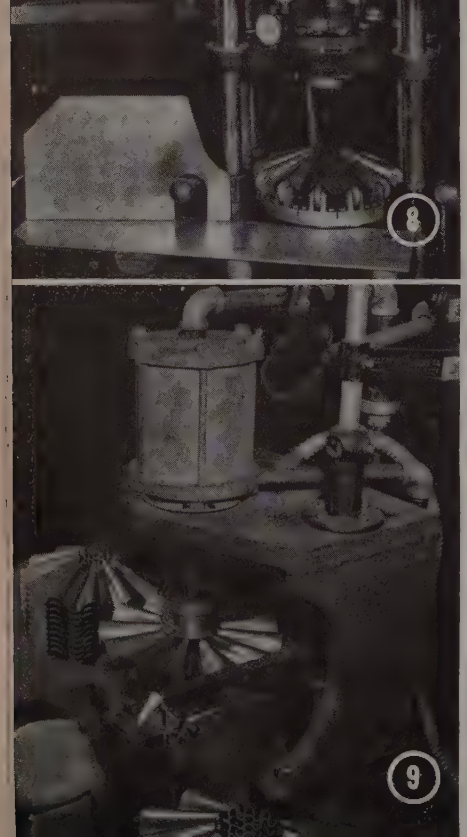
Each disk is next shifted to a Sundstrand lathe and the inner diameter is subjected to a chamfering operation which gives this diameter a radius. The purpose of this is to eliminate sharp edges which, if they remained, might be subject to cracking when the disk is formed or subsequently flexed.

When unloaded, disks are dropped into inclined chutes, as in insert Fig. 2, and rolled onto a woven wire belt which carries them through a washing machine, Fig. 2, to remove oil. Upon issuing from the washer, disks are stacked automatically on the circular rack shown which has six positioning tubes. Later these are stacked in piles on another rack which,









when filled, is lowered into a Homocarb furnace for bright annealing, as shown in Fig. 3 In this furnace the disks are spherodized for 6 hours at 1275° F. The reducing atmosphere, supplied by a General Electric generator, consists of 40 per cent Driolene gas and 60 per cent products of combustion. After spheroidizing and cooling to 1000° F, disks are transferred to a cooling pit and cooled to room temperature. They then are ready for forming.

This severe forming is done cold in a 250-ton HPM hydraulic press after roller coating each disk with a drawing compound in the setup shown in Fig. 4. A disk is shown in the die after forming in closeup, Fig. 5. Forming not only produces deep radial corrugations and a dished shape, but decreases the outside diameter considerably. Good lubrication and a die having well polished surfaces are required to facilitate movement of the metal against the die, and to avoid fracture, for the metal is worked well beyond its elastic limit, of course, so as to retain the desired shape.

Before heat treatment, the formed disks are passed through another washing machine to remove the draw compound. Washing is done hot, hence the disks dry quickly before being placed in the tempering furnace, which is a rotary radiant-tube type.

The formed disks are transferred to the hardening furnace where they are heated to 1500° F for 12 min. On removal, the heated piece is quickly placed in the lower half of a quenching die on a No. 16 Gleason press, Fig. 6. This press is tripped, closing the die on the spring. A large volume of quenching oil is introduced to the die, flowing continuously for 15 sec to completely quench out and harden the spring. Use of a quenching die is necessary to prevent distortion which generally accompanies free quenching of thin sections of this type.

After this hardening procedure, springs are tempered at 800° F for 30 min in a continuous draw furnace. Following the draw and air cooling, each spring is inspected for hardness, the values of which range from 63 to 65 rockwell C. This hardness test is followed by shot peening both sides of the springs in a Wheelabrator machine. At the loading station the springs are placed on rubber covered tables which turn slowly as they are advanced by a conveyor through the peening operation. After one circuit, the springs are inverted for a second traverse through the machine, so that both faces receive the same treatment. Peening results in putting the whole surface under compression and thereby greatly increases resistance to fatigue failure.

Before being subjected to test, each spring is flexed from its dished shape to a position ½ in. below flat position, as shown for the springs under the press rams in Fig. 7. For flexing, the springs are placed on fixtures each of which has a series of rollers around its outer diameter. These rollers are in contact with the outer portion of the spring and rock about their axes as flexing takes place.

Fixtures are advanced under the rams by a chain which is given an intermittent motion. Indexing is such that one fixture comes to rest automatically under each ram except when the chain is being advanced. Timing in this semi-automatic setup is such that each spring is flexed six times before being unloaded. Loading and unloading are done by hand, before and after the fixtures pass the flexing stations. Flexing applies a predetermined deflection and is intended to stress the spring beyond the maximum stress in service.

After this flexing, all disks are load tested individually in the setup shown in Fig. 8, which includes a hand-controlled air-operated flexing press combined with a Toledo scale that indicates the load applied in effecting a deflection to the flat position while the disk is supported on a fixture like those used for the prior flexing. Specifications require that the load for the specified deflection must not be below 285 or above 310 lb.

If outside these limits, the springs are then shot peened on the top face. Those that are high are shot peened on the bottom face. This further shot peening has the effect of either raising or lowering the static flat load of a spring, depending upon which side is re-peened. This operation is performed on a Wheelapeen machine while the spring rests on a rotating table, with the door closed and locked. All springs re-peened are again flexed.

Springs are also checked to determine

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whether any are out of round and whether the center hole is concentric with the outer diameter of the spring. This is done in the machine illustrated in Fig. 9, which includes a multiplying lever arranged so that its pointed end moves over a scale marked with limits within which variations are permitted.

If the indicator swings beyond the limits, the spring is rejected and its diameter is reground to bring runout within the limits of 0.050-in., total indicator reading. During the test, the spring is clamped and flexed on the fixture by an air ram and is rotated slowly with the fixture by a motor controlled by switches under the operator's hands. While running, the indicator lever is pressed against the periphery of the spring. Springs th pass this test are ready for assembly in clutches.

It can thus be seen that the producti setup is not only well chosen for the j in hand but that all steps are so controll as to insure a product which meets exa ing standards and requirements of t manufacturer.

Flux-Injection Cutting

(*Concluded from Page* 82)

occasional inspection and thorough cleaning is all that is required to guard against this difficulty. Most effective method of cleaning out any flux accumulation is to immerse the tip in clear water. Since the flux is readily soluble, this method effects a complete cleaning. It must be followed, of course, with thorough drying in an air blast, as any moisture left would only re-create the difficulty.

Since the addition of another variable —flux flow—makes flux injection a little more complicated than straight flame-cutting, even the experienced torch operator finds a little practice and trial-and-error work on scrap valuable, before he starts production cutting. With a little practice, however, proficiency comes rapidly, and the average operator soon handles the flux-injection process as easily as he does ordinary flame cutting.

In fitting flame cutting of stainless steel into the facilities of the shop, one further factor should be kept in mind. In any operation of this kind, where fumes are evolved, the operator should naturally be protected by adequate ventilation or a fume-collecting system.

Once management, engineers and designers get used to the fact that stainless can be and is being flame-cut, the torch tends to fill the same roles in the stainless steel shop that it has in mild steel work.

Struthers Wells Corp., Warren, Pa., makers of special processing equipment and machinery, and very heavy users of stainless and clad steels, use flux injection flame-cutting for a variety of special shapes and straight cutting jobs, at remarkable savings. The flame-cut disks, Figs. 14 and 15, were cut by flux injection—fourteen of them in the time it previously took to cut four by machining, with crane lifts reduced from five per disk to one. Savings ran to hundreds of dollars per 8-hour shift—and the large pieces of scrap are useful salvage instead of chips and shavings as they would have been after machining.

Capacity of the process to produce sharp points and smooth curves is indicated in the parts, Fig. 11, cut by Smith & Caffrey Co. from type 347 plate, in. thick. These shapes, only about in. long, are combined with other flan cut stainless and clad parts as large 12-ft dished and flanged heads, Fig. into a huge paper making machine.

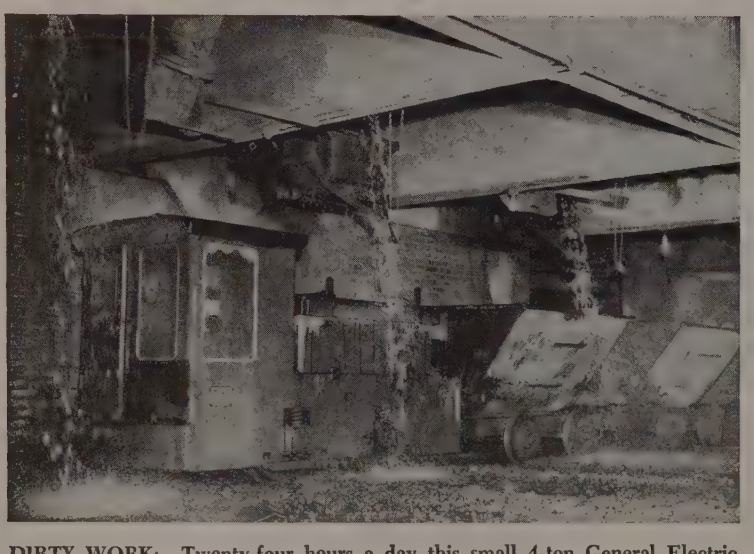
Riser removal, Fig. 12, is as routine operation with flux injection as any oth and since cut quality is not quite so i portant in this case, speed and pressu balance is not as critical. The result cut, Fig. 13, is of excellent quality a leaves the casting ready for finishing w a minimum amount of grinding requi to remove the pad. On a producti scale, many risers are more easily ha dled if the torch is in a horizontal po tion, Fig. 16, and this is perfectly feasi with the flux-injection process.

While most of the applications ci are on a large-scale basis, they are c fined to lighter material in warehou fabricating shop, or foundry. In t steel mill itself, however, flux-inject cutting plays an equally important pa helping to speed up and economize t mass production of sheet, plate and l stock from ingot slabs. Here slabs rol from ingots to thicknesses of 3 to 5 are ripped lengthwise and again crossw into sizes required for sheet and st mills. Two flux feeding units are in eration in this mill, and other applicati include splitting 22-in. ingots for t purposes, and cutting up scrap ingots charging box size.

So, we find flame-cutting of stainl steel by the flux-injection method red ing costs and speeding production ri down the line—from the mill to cl tolerance detail work in the last sta of fabrication. All kinds of extravag predictions can be—and are—made ab the meaning of this new tool to the ture of corrosion resistant high al steels—but such generalities, pleasant they are to contemplate, could only based upon the clear hard facts that ha already emerged in the plants where process is already a routine operation.

—o—

Four simple connections—electri thermostatic, stack and oil line—are quired to set up and operate its new mestic oil-fired winter air conditioner, cording to York-Shipley Inc., York, Called the Warm-air, it has a capac of 65,000 Btu per hour.



DIRTY WORK: Twenty-four hours a day this small 4-ton General Electric battery locomotive hauls wet ash and soot from the boilers of Philadelphia Electric Co.'s power generating station at Chester, Pa. Servicing three aisles of boilers, four boilers to an aisle, the locomotive moves 175 cars of ashes and 60 cars of soot in a 24-hour period

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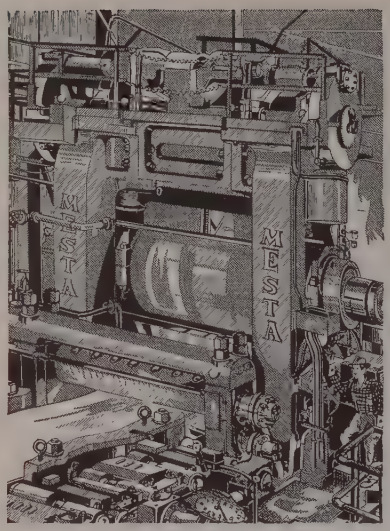

Exact percentage, types of soap, additives, etc. required to obtain correct lubricants for steel plant equipment such as pressure systems, roll necks, bearings, mill tables, reduction gears and pinions are described and tabulated. Difference between worked and unworked penetration value should not exceed 40 points

Selecting Correct Lubricants for Steel Mill Equipment

By A. E. HICKEL,
Consulting Lubricating Engineer
Chicago

MODERN application of lubricants has produced some changes in oils and greases. Automatic supply and proportioning of grease as used on specific bearings require a lubricant somewhat softer than under the old hand application methods. Selection and type of lubricant and method of application for each piece of equipment is important, if satisfactory lubrication and uninterrupted operations are desired.

The older type of oils and greases have been greatly improved by better manufacturing methods and by the use of cleaner stocks. Extreme pressure lubricants also are used with satisfactory results on bearings subjected to high-unit pressures. Some of the mixed-base greases (sodium greases containing 2 to 3 per cent calcium soap), as well as those greases made from aluminum stearate or calcium soaps containing a special asbestos fiber, help to reduce shock when used in the lubrication of open gears. The newer lithium greases, and the high-temper water-resistant greases may replace equally well some of the older types of lubricants.

Steel mill lubricants to take care of both the old and new equipment require a number of greases and oils according to recommendations made a few years ago by C. C. Pecu, formerly Lubricating Engineer, Lackawanna Plant, Bethlehem Steel Co., Buffalo. The greases are classified according to their use on various equipment in the rolling mills, sheet and tin mills, blast furnaces, open hearths, ore docks, power plants, etc.

All consistencies of these steel mill greases specified by Mr. Pecu, were "unworked" penetrations. The unworked penetration represents the grease consistency as it is when received in drums, etc., while the "worked" penetration indicates the consistency of the grease after 60 double strokes in the A.S.T.M. worker, which represents the approximate condition in actual service. A poorly manufactured grease, purchased on the unworked penetration, may break down too readily in the bearing, causing excessive leakage under actual service conditions. The difference between an unworked and worked penetration should not be over 35 to 40 points, depending on the type of soap and kind of grease. The milled greases and those made with heavy viscosity oils usually break down the least.

For ordinary grease cups: A cup grease having a low viscosity oil and a soap content according to the various penetrations needed are used.

Hand guns and pressure system greases: High-speed light work requires a grease with a low cold test, low-viscosity oil and a low percentage of soap. Heavy and hot work requires a grease with high viscosity, high flash oil and low soap content. Penetration, unworked—250.

Roll neck grease: Hand-packed mills and babbitt bearings require a hard grease containing an oil of high viscosity and high flash; high tallow and soap content, and 7 per cent graphite. Penetration, unworked—56.

Soft grease: Pressure greasing system (babbitt bearings) calls for a high-flash, low viscosity oil, high tallow and low soap content with 7 per cent graphite. Penetration, unworked—220.

Hard grease: Hot neck, hand sheet mills take a heavy asphaltic oil containing 9 per cent Bentonite, 3 per ce Neutral Degras, with an oil viscosity 700 SUS (Saybolt Universal Seconds 100° F.

Soft grease: Roll neck roller bearin call for a high-viscosity, high flash with not over 3 per cent E.P. (Extre Pressure) additive and 3 per cent sulph or 3 per cent sulphur and 7 per ce lead. Penetration, unworked—250.

Pinions: Open housing pinions requ several straight reduced Southern Te oils having viscosities from 1750 6000 SUS/100° F depending on t speed of the mill. Closed housings ne a straight reduced Southern Texas as specified for use in open housings a base and cut back with a straight duced steam refined cylinder oil havi a viscosity of 145 SUS/210° F. T finished product must not have a high viscosity than 3200 SUS/100° F.

Soda base transmission grease: T requires a low-viscosity, medium fla and low cold test oil, 5 to 7 per ce graphite and 3 to 7 per cent E.P. ad tive in the finished product and a pen tration, unworked of 300 to 360.

E.P. (Extreme Pressure) lubricants: be made from low-viscosity, mediu flash and low cold test oils. The E. content not to be over 7 per cent a the viscosity of the finished product a cording to speed—1300 to 3600 SU 100° F.

Mill reduction gears: Call for a so base transmission grease, low-viscosi low cold test oil with 5 per cent graphi Penetration, unworked—300.

E.P. leaded lubricants: Same as us in pinion cases.

Roller bearings: Light and high-spe mills need low-viscosity, low cold te oils and low soap content. Penetratio unworked—350-365.

Worm drives on mill screws: Requi a high-viscosity, low pour test oils wi

(*Please turn to Pages* 110, 114)

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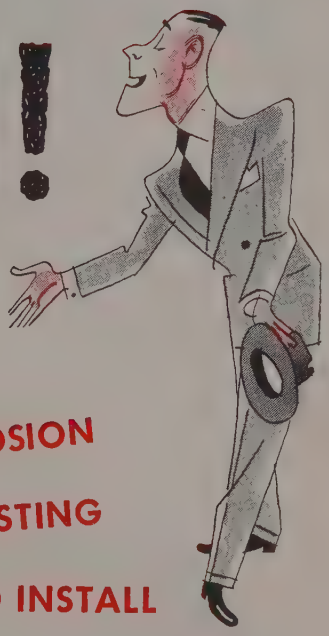

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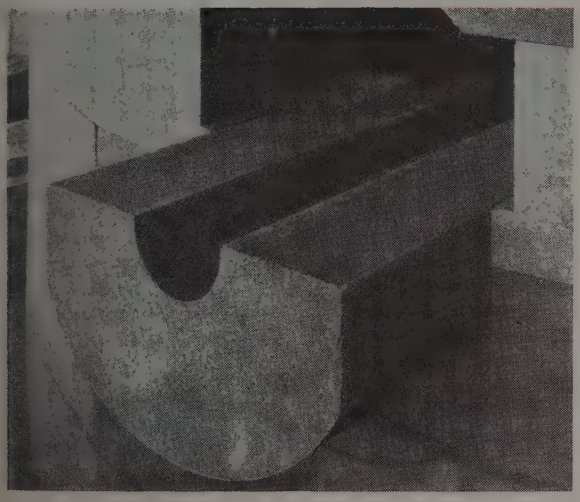

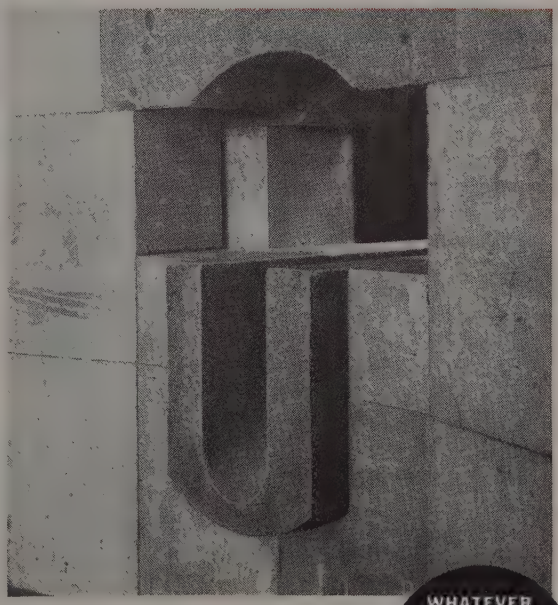

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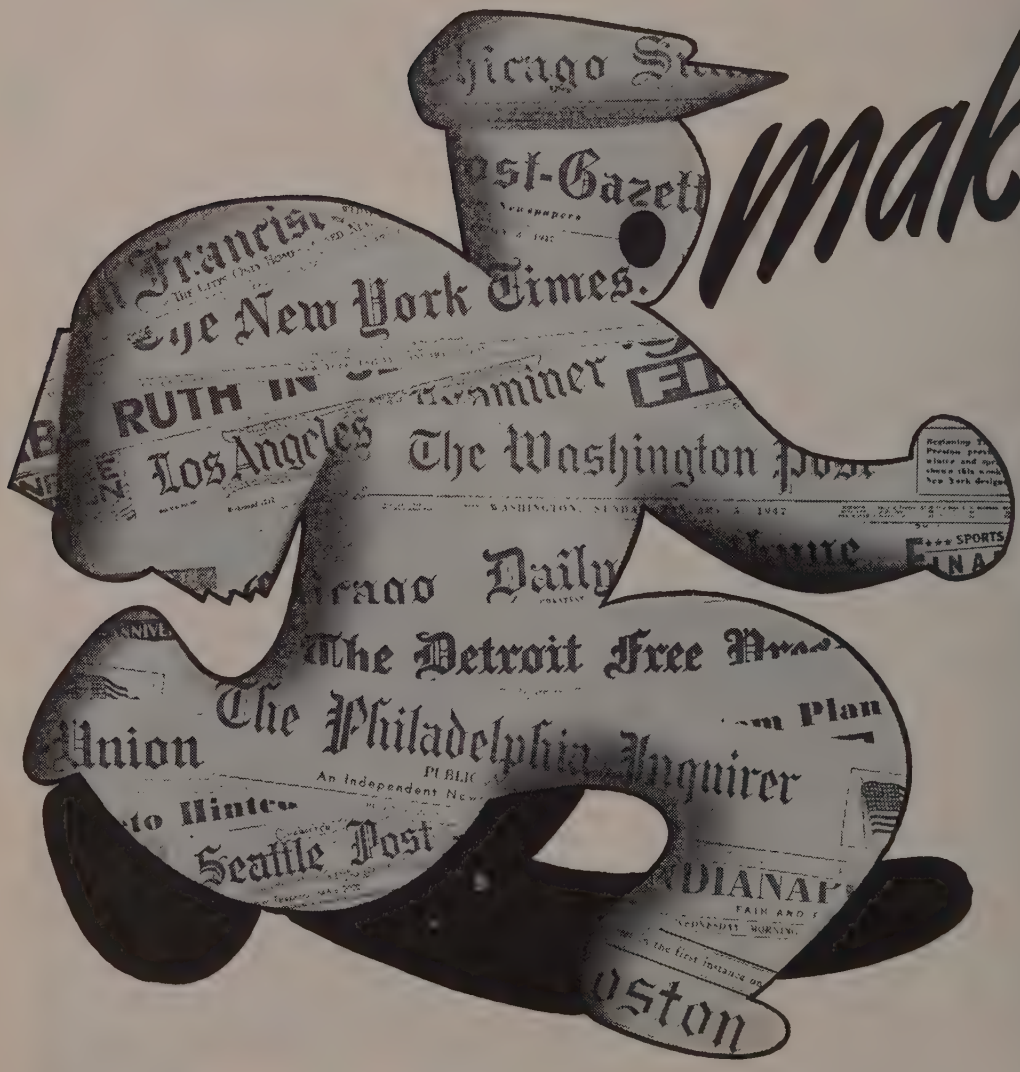

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Analysis of Typical Steel Mill Lubricants

Trade Name	% Soap	Viscosity, SUS/° F	Oils Used	Pour Point ° F	% Graphite	E. P. Additives	ASTM-D217-44T Penetration unworked	Dropping P ° F
Cup greases	Calcium soap acc. to ASTM number	150-180/100	Mid-Cont.-So. Texas Penn.	—0 to +16 —0 to —35 —0 to +25	None	None	Acc. to ASTM number used	200 or b
Grease: hand guns	Calcium soap 11.86	225/100	Mid-Cont.	—0	2 (Synthetic)	None	361	208
Grease: pressure systems	Calcium soap 15.88	900/100	So. Texas	—16 to —20	None	None	247	205
Roll neck grease: Babbitt bearings (Handpacked)	Soda soap 27.89	2000/100	Mid-Cont.	+15	9 (Mineral)	None	56	.....
Roll neck grease: (Handpacked) high Tallow content	Calcium soap 35.25	120/210	So. Texas	—0	7 (Synthetic)	10% free beef tallow	57	220
Babbitt bearings: pressure system	Calcium soap 17.67	800/100	So. Texas	—0	7 (Mineral)	None	225	210
Hot neck grease: hand sheet mills	Soda soap 33.00	718/210	Penn. & So. Texas	+12	None	9% Bentonite 3% Degras	42 Cone 150 grams 68 Cone 300 grams	405
Roll neck roller bearings: open housing; hand application, pinions	Soda soap 19.00	800/100	Mid-Cont.	+20	None	3% Hallowax 3% Sulphur	245	345
Transmission grease and Reduction gears, mill drives and lighter (with bath)	Soda soap 8.00	78/210	So. Texas	—10	7 (Synthetic)	3% Hallowax	300	295
	or Soda soap 5.42	74/210	So. Texas	—10	5 (Synthetic)	7% Hallowax	360	282
E. P. Lubricants	.....	1300-3600/100 acc. to speed	Mid-Cont. or Penn.	—10	.....	7% E.P. (not over)	.....	.....
Reduction gears, E.P.: mill drive & lighter roller bearings	.....	3500-5500/100	Penn.	—6	.....	7 to 9% lead soap	.....	.....
Roller bearing grease: (normal conditions)	Calcium soap 11.20	225/100	So. Texas	—10	None	None	350	294
Motors (higher temperatures)	Soda soap 14.24	350-400/100	Mid-Cont.	+10	None	None	320	325
Mill tables, bearings: plain roller bearing grease (hot condition)	Soda soap 19.38	160/210	Penn.	+25	None	None	246	357
Worm drive on mill screws	.....	2600/100	Mid-Cont.	—10	None	5% Hallowax	SAE 536 #390	.....
Mill tables: plain & roller bearing grease, cold condition	Calcium soap 18.00	900/100	Mid-Cont.	+15	None	None	290 (285-375) acc. to speed	202
Manipulators reduction drive gears	Soda soap 8.75	175/100	Penn. & Mid-Cont.	+15	None	None	362	305
Large mill pinions: (soda base transmission grease)	Soda soap 16.74	300/100	So. Texas	—0 or better	5 (Mineral)	None	227	340
Motors for hot and cold saws: (1) normal temp.-lime soap	Calcium soap 8.00	215/100	Mid-Cont.	—0	2 (Synthetic)	None	365	200
(2) mill, general, heavy & warm locations	Soda soap 23.50	90/210	Mid-Cont.	+10	None	None	218 (milled)	347
(3) high room temperature	Soda soap 13.85	350/100	Mid-Cont.	+15	None	None	340	310
Gear shield: (Soft pinion grease) enclosed and open gears, winches, etc.	.....	236/100	Mid-Cont.	—0	25 W.W. Rosin	0.50% Pine tar	305	.....
Gear Shield: (Hard pinion grease)	.....	236/100	Mid-Cont.	—0	39.50 W.W. Rosin	0 50% Pine tar	190	.....
Cold water plunger grease	Calcium soap 8.79	Penn. petrolatum 62/210	Penn.	.....	7 (Synthetic)	None	350	186

Blooming mills, heating furnace cranes, truck wheel roller bearings: Use same as for mill tables, hot condition. (19.38% soda soap, 240 penetra unworked.)

Heating furnace cover journals: Use grease specified for mill tables (gear bath on single rolls) but before cutting back to 290 penetration, unwor

Mill tables, gear bath on single rolls, exposed winter: Use soda base grease having 240 penetration, unworked, and cut back with 12.5% special So ern Texas oil having viscosity of 250 SUS/100° F, which will make the desired mill table gear bath lubricant having a 290 SUS/100° F viscosity.

Line shaft drive gears: (Open) use a Southern Texas st. rd. oil, 4000 SUS/100° F; (closed) use a Southern Texas st. rd. oil, 2000 SUS/100° F; (w ipulator) same as mill tables (cold condition grease).

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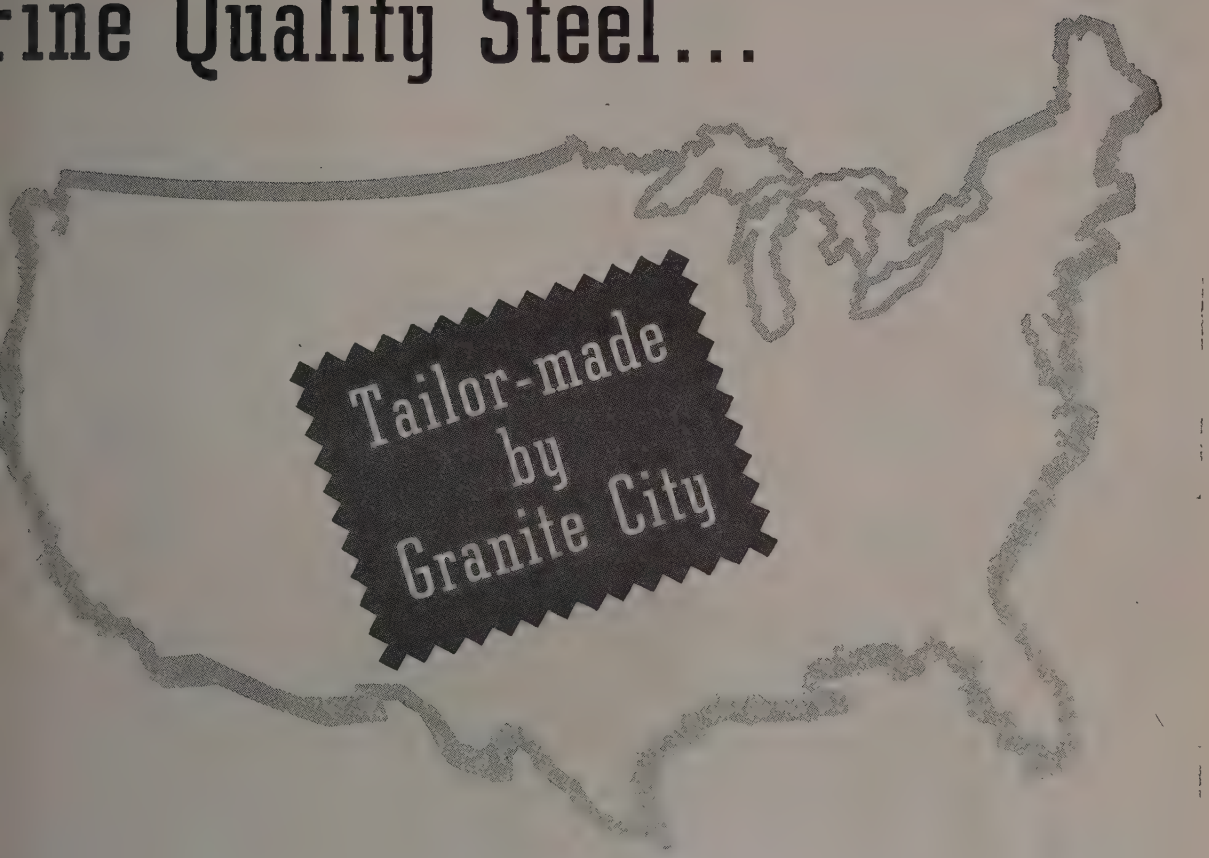

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varying E.P. content according to the type of E.P. additive used; viscosity of finished product not to exceed 2600 SUS/100° F.

Mill screws: About the same lubricant as for worm drives, but viscosity should not exceed 4200 SUS/100° F.

BLOOMING MILL LUBRICANTS:

Heating furnace cranes: All sleeve babbitt bearings use a high viscosity, high flash test oil with low lime soap content. Penetration, unworked—240. Truck wheel roller bearings take the same grade of grease as just mentioned. Gears take an asphaltic stock with a viscosity to suit speed and temperature.

Heating furnace cover journals: A high melting point grease that will melt to a jelly in service is specified for open type journals. Roller bearings require a high-viscosity, low soap content grease. Penetration, unworked—240.

Mill approach table: This calls for a high-viscosity, high flash oil and low-soap content grease. Penetration, unworked—250.

Lineshaft drive gears: Open gears use an asphaltic oil of 4000 SUS/100° F. and those of the closed type, an asphaltic oil of 2000 SUS/100° F. Manipulators use a high-viscosity, high flash oil, lime-base grease. Penetration, unworked—250.

Manipulator reduction drive gears: These call for a soda base cylinder stock transmission grease. Penetration, unworked—360-380.

Mill pinions and teeth: These need an asphaltic stock of 5000 SUS/100° F., cut back to 3000 SUS/100° F with a straight reduced steam refined cylinder oil. Hold level to about three-quarters the length of tooth.

Modern pinion housings and neck bearings: These (oil sealed away from bath) use a soda base transmission grease, with a high-viscosity, low-test oil with 5 to 6 per cent graphite. Penetration, unworked—230.

Mill roll necks: Hand-packed necks take a conventional type hard grease, with high-tallow content, high-viscosity and flash oils, with not over 7 per cent graphite. Penetration, unworked—56. Pressure greasing system for babbitt bearings use a soft grease with high flash, low viscosity oil, high tallow content with 7 per cent graphite. Penetration, unworked—220 as shown under Soft Grease, babbitt bearings—pressure system.

Runout tables: Necks, plain and roller take the same lubricant as for approach table. Lineshaft gears call for a soda base transmission grease. Penetration, unworked—360, see under lineshaft drive gears.

MODERN BAR MILL LUBRICANTS:

Mill tables: The same lubricant as the blooming mill is used.

Reduction gears: These call for a so base transmission grease, having a lo viscosity, low pour test oil with 5 cent graphite. Penetration, unworked 340.

Mill pinions: Need a soda base gre having a low-viscosity, low cold t oil with 5 per cent graphite. Penetrati unworked—190, cut back with neck to a viscosity of about 2400 SUS/100°

Roll necks, babbitt bearings: Requ a soft graphite rollneck grease, (7 cent graphite). Penetration, unworked 230.

Flying shears (revolving): Roller be ings need a low viscosity and low c test oil with low soap content. Penet tion, unworked—365. Reduction ge call for a high-speed E.P. lead so low cold test grease, having a viscos of 3000 SUS/100° F.

Three other greases for motors, c calcium base grease and two soda b greases are shown in accompanying ble, also lubricants for worm drive mill screws, gear shield and a cold wa plunger grease. Some soluble oils also used for rolling the lighter ste as well as the old standby—palm oil.

An analysis of steel mill lubricants presented in tabulated form on Page 1

Supersonics

(*Continued from Page* 75)

ing along the length of the bar or billet and by the position of the defect or defects in the section. If the specimen is of circular section, rotation of the specimen is usually sufficient to distinguish between cracks and segregation, the echo vanishing when the supersonic wave travels along the plane of the crack. In general, as experience is gained with different types of defects and the flaws are subsequently examined by other methods, the diagnosis becomes more reliable.

A typical photograph of hair-line cracks in a 6 in. square billet after fracture is shown in Fig. 4. These cracks have an appreciable surface area and can be readily detected by the supersonic flaw detector when examined from a surface parallel to the plane of the crack. These cracks, however, are of small width, and cannot be detected from a direction in or near the plane of the crack, the intensity of the echo diminishing as the angle between the planes of the crack and the surface of examination increases. If the examinations are made from two directions at right angles, any crack present will almost certainly be detected.

Investigations into the problem of hair-line cracks have been assisted by the supersonic flaw detector, and it has been found that continuous examination of a test-specimen which had been air-cooled after rolling enabled the incubation period, i.e., the period between rolling and the appearance of the first flaw, to be determined accurately. Diagrams drawn during subsequent examination show the order in which the flaws continued to develop. An example of this is given in Fig. 5, which shows the positions of flaws detected by examination from two adjacent surfaces. Development over a prolonged period does not appear to follow any order, but provides information suggesting the steady development for 50 hours after an incubation period of 20 hours.

In the further processing of forged bars of an austenitic-type steel, certain failures were observed; bars were therefore examined by the supersonic method and certain reflections were observed at several positions. After slicing along the diameter and etching, internal cracks were seen at the position indicated by the echoes, a photograph of which is shown in Fig. 6. Although the percentage of this class of material which was found to be defective was small, the removal of the defective portions enabled further processing of it to be avoided.

A 3-in. square billet of 4.25 per c nickel-chromium steel, air-cooled fr the rolling temperature, contained major crack stretching from a surf nearly across the full width of the bil A pronounced echo to the left of bottom echo was obtained when test was carried out across the crack. reflection from it was obtained wh testing was carried out along the cra

Eight-inch diameter forged bars a high-alloy steel were known to cont segregation over a certain portion of th length. It was found that an accur estimate of the length of discard nec sary could be made by supersonic e mination. Since the echoes from segregated areas were of great am tude, the examination could be m rapidly.

A sample of the high-alloy steel containing pipe gave a strong reflect midway along the trace, as shown Fig. 8. A similar bar, which was the same size and composition, but piped, gave a clear trace before the b tom echo. The photographs of the tra indicate the magnitude of the reflec wave from the pipe.

TESTING OF SLABS AND PLATE

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thick plates (greater than about ¾-in.) for hair-line cracks is quite practicable by the method already described for billets and bars. The hair-line cracks, if present, lie in planes parallel to the plane of rolling, and in this case, the lesser practicability of testing in two directions at right angles is therefore not of importance. The tests are carried out in the usual manner, working with both probes (with or without wedges according to the thickness) on the same surface.

A particular trouble associated with steel plate is the presence of lamination, due, for example, to the rolling-out of pipe incompletely removed from the original ingot. A portion of the plate contains a plane of separation lying parallel to the plane of rolling and usually occurring approximately midway across the thickness. This is a major defect, and in the thicker sections (about ¾-in. and upwards) a plate can be explored from one surface by normal methods.

For thin plate, a more certain method is to carry out the test by transmission, i.e., by holding the transmitting and receiving probes opposite each other on each side of the plate. If the plate is sound, a strong signal is received, but if laminated, the signal is considerably reduced in intensity and usually completely eliminated. The result of a particular test on a piece of 0.33-in. plate is shown in Fig. 7. This plate was explored by the supersonic method, and the laminated area so determined was outlined with white paint and photographed. The plate was then sectioned into strips and the limits of the lamination determined by magnetic etching; these results are superimposed on the photograph (Fig. 7). Actual experimental points are shown encircled, and the agreement is seen to be quite good; the differences are within the limits to be expected with the size of exploring probes used.

It is not difficult to construct special tongs to hold the probes correctly on either side of the plate. Also, it is fortunate that the as-rolled surface of steel plate is normally good enough not to require any special preparation.

In composite plates consisting of two materials (e.g., mild steel and stainless steel) welded together, there may be areas over which adhesion is poor. The problem of detecting such areas is essentially the same as that of detecting lamination, and the same methods may be used.

A 10⅜-in. thick slab had shown extensive axial cavities after removal of the "top" discard, and supersonic testing was resorted to in the determination of the extent of penetration of this unsoundness, with a view to utilizing the sound portion of the slab that was tested.

Entire surface of the slab was supersonically tested after machining. Over the top central portion, where no bottom echo could be obtained, major defects were presumed; over a considerable extent of the remaining surface there was evidence of numerous small discontinuities, while towards the extreme bottom end, only traces of discontinuities were indicated.

A quarter longitudinal section of this slab gave good confirmation of the supersonic estimate. The discontinuities found in the area of lesser unsoundness were on the whole of a small order, and those associated with the primary segregation there were merely incidental, their presence in a mass of this nature being virtually unavoidable.

The area of slight reponsiveness at the "bottom" end showed no discontinuities on half-sectioning, but quite possible, irregularities of an extremely small order may have been present elsewhere, through the thickness of the slab at this position. Here is an instance, therefore, where negligible irregularities in a large mass are clearly recorded supersonically as a result of the use of an instrument having a high degree of sensitivity; the need for discriminate interpretation of the results obtained, with consideration of the nature of the specimen, is once again emphasized.

TESTING CASTINGS

G. T. Harris
William Jessop & Sons, Ltd.

Supersonic flaw detectors have been applied to the examination of a variety of castings, and some of the observations made are recorded below. In general, it has been found that the flaw detector has been of use in the examination of castings for areas of porosity and internal cavities, provided that these areas are of appreciable size. In certain cases, particularly on ingots, results have been negative, apparently owing to the general looseness of the structure.

Examination of cast armor plate has been found to yield information on the location of areas of porosity. After preparing the surface of a 20-mm, thick cast plate on a shaping machine, a defective area was revealed, at approximately half depth, which could be traced satisfactorily, and subsequently confirmed by an x-ray radiograph. Examination of a cast-steel tank turret, with an average thickness of 5 in., enabled the position of certain shrinkage cavities, due to inequality in section, to be mapped out. Preliminary examination carried out from the machined top surface gave the approximate position of the defects, which were subsequently located more precisely by examination from the surface of the casting. In this case the surface was not specially p pared, contact being established means of plasticine and using the te nique which will be subsequently d cribed. Although the areas were locat they were considered to be only ¼-in. diameter, and subsequent firing tri showed no detectable difference in ballistic properties. It was evident, ho ever, that the method would be of gr use in the examination of such casti for location of shrinkage cavities.

In certain cases it has been fou that owing to the generally more op structure of castings, better results be obtained using a lower frequency supersonic wave in order to reduce general scattering. For instance, exa ination of a casting varying in thickn from 1½ to 3 in., using the bare qua on flat smooth surfaces demonstra that, with the 2½-megacycle filter, clear bottom echo could be obtained certain parts of the casting, but t this difficulty could be overcome the use of a 0.8-megacycle tuned cuit in the transmitter.

Successful results have been obtai with the method in the examination cast-iron castings, provided that casting has a sufficiently large flat s face on which the probes can be us and the metal thickness is greater th about ½-in. In such cases, the meth has proved of considerable value, a little hindrance has been found fr the presence of the usual graph flakes in cast iron. In a particular c where it was thought that reflecti were being obtained from the graph a microsection indicated the presence scattered porosity, which was presu ably the cause of the observed echoes

Typical example of a successful ap cation of the method to cast iron is lustrated in Figs. 11 and 13. Fig. shows a pencil tracing taken from screen during examination of a pul casting of approximately 3 in. thickn The material was found to be larg sound, but a particular part gave str indications of a fault at an estima depth of 1¼-in.; this was confirmed subsequent sectioning, as shown in 13. This application has proved of so interest, as examination of such co ponents was previously impossible defects near the bore were discove only on final machining.

THE TESTING OF WELDS

By J. Glen
Colvilles Ltd.

Chief defects which may arise welded steel structures are slag entr ment or blowholes in the weld me and cracking either in the weld or the thermally disturbed zone of parent plate.

The material consisted of steel pl

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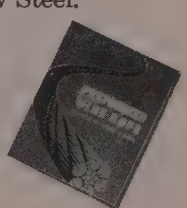

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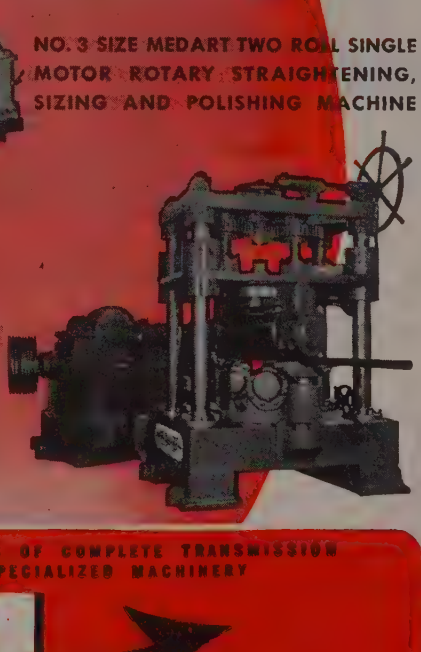

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of 1 to 3 in. in thickness, which had be butt-welded by the electric-arc proce It ranged from mild steel to low-all steel, so that the hardness at the we junction varied up to a maximum s ficient to cause cracking. The welds we made with both ferritic and stainle steel electrodes. Apparatus used was t Mark I, supersonic flaw detector, fitt with a 1¼ or 2½-megacycle filter. T apparatus is not nearly as sensitive subsequent models of the same type. simplify the description of the resu obtained, the data have been group under the type of defects, as follows:

Using the 30° angle probes and kee ing the distance between the wedg fixed so as to give the maximum bott echo for the particular thickness of pla attempts were made to retain the bott echo as the probes were moved across along the weld. Even with the liberal u of amalgam, or plasticine impregnat with oil, it was impossible to obtain a echo at all with the probes in cont with the weld-metal surface.

Applying Probes to Gas-Cut Edges

One other method was possib namely, by applying the probes to t gas-cut edges of the parent plates, that the supersonic beam travelled pa allel to the plate surfaces, as shown Fig. 9. In every case good echoes we received from the opposite edge of t welded plate. The maximum size of pla tested was 2 ft 6 in. square. It was th established that the varying hardness a microstructure of the thermally disturb zone, and also the composition of the we metal, did not produce severe dampi or reflection of the supersonic beam.

No great care was taken to achie dead flat surfaces. Owing to the undul ing nature of the buffed surfaces, it w found necessary to use amalgam, plasticine impregnated with oil, with t 30° angle probes. The plate was th scanned by the usual method, as show in Fig. 10. An echo received before t bottom echo indicates a defect parallel the plate surface, while a diminution the bottom echo indicates a defect pe pendicular to the plate surface.

Owing to the hills and hollows made the buffing, and also, in some cases, the fact that the plates after weldi were not dead flat, it was found that t amplitude of the bottom echo vari greatly, as if there were a vertical defe On varying the distance between t probes, it sometimes appeared that the was total reflection from a horizontal d fect in the weld. In effect, any res can be obtained, either through bad co tact between probes and metal, and through slight tilting and slewing of t probes so that they are no longer paral With proper preparation of the surfa no difficulty was found in obtaining

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consistent bottom echo, thus demonstrating that the welds were free from major defects.

For the experiments given in the following description of the detection of defects, a sufficient area of the plate was machined flat to ensure reliable results.

Two typical examples of slag entrapment in welds were obtained:

(a) One-inch thick mild-steel plate, hand-welded, using a single V-edge preparation. There was excessive slag entrapment about the center of the weld.

(b) Three-inch thick low-alloy steel plate, hand-welded, using a double V-edge preparation, and stainless-steel electrodes. A section through the defective area is shown in Fig. 14.

Since the defects were essentially parallel to the plate surface, they were readily detected as an echo received before the bottom echo, as in Fig. 10. Had they been essentially perpendicular to the plate, they would have been revealed only by a diminution of the bottom echo, as shown by Fig. 10.

Typical examples were as follows:

(a) One and one-half-inch thick mild-steel plate, welded by the electric-arc process, using a single V-edge preparation. The weld was 2 ft long, and was found to be cracked for a distance of about 6 in. from each end. A section through the weld showing the crack is represented in Fig. 12.

(b) Two-inch thick low-alloy steel plate, welded by the electric-arc process, using a single V-edge preparation. Five runs were used to fill the V. In one area of the plate, a small vertical crack, ¼-in. deep, 1-in. long was found in the first run of weld metal.

(c) Three-inch thick low-alloy steel plate, welded by using a double V-edge preparation and stainless-steel electrodes. A large crack was found at the weld junction of one side of the V, as shown in Fig. 15. This crack did not quite extend to the surface of the plate. The cracks in the weld were all essentially perpendicular to the plate surface, and thus, by the method shown in Fig. 10, the defects were revealed only by a diminution of the bottom echo. By this method the crack in the weld of (b) was too small to be detected by the Mark I equipment. Confirmation of the presence of the cracks was obtained by the method shown in Fig. 9, the weld seam being normal to the supersonic beam. In this case, a reflection was obtained, even fr the small crack present in the weld.

With the Mark I equipment it appe that the varying hardness and mic structure of the thermally disturbed zo of the parent plate, and also the structu and analysis of the weld metal, do n cause any appreciable damping or flection of the supersonic beam.

First essential in the satisfactory testi of welded plates is to ensure that t surfaces of the weld and adjacent par plate are finished dead flat. With t provision, defects horizontal to the w surface can be detected in the usual w by an echo received before the bott echo. Vertical defects are revealed by diminution of the bottom echo. They also readily revealed in the usual w by testing from the plate edges. T method, however, is not always possib Considerably more work is necessary, ing the most up-to-date equipment, establish fully the above conclusions a to determine the actual size of defec

A great advantage of the superso method is that very thick welds are w within its scope, and it should thus possible to reveal flaws which the rad graphic method might not detect.

Control of Vibration

(*Continued from page* 79)

the use of internal combustion engines or in practically any type of machinery where rotative force is converted into reciprocating motion, or vice versa, at high speeds. This isolator can also be used for absorbing periodic shocks which are low in frequency, short in duration, but relatively high in intensity, such as are associated with punch presses, stamping machines, etc.

It is often advantageous to mount the required sections of dampener onto steel plates to help distribute the stresses proportionately among the several pieces of dampener. If the machine that is to be mounted is so constructed that it applies several concentrated loads, of considerable magnitude, at points relatively far apart, it is recommended that steel channels be installed to afford a greater resistance to the bending movements of concentrated loads. In addition, this forms a protection for the isolator from mechanical injury and from contact with oil.

Procedure used in installing the type CA-148 isolator is first, the determination of the following data:

(1) Static load of the machine to be followed.

(2) Estimated distribution of this load.

(3) Estimated impact, if any, and how it is distributed.

(4) Allowable or desirable deflection.

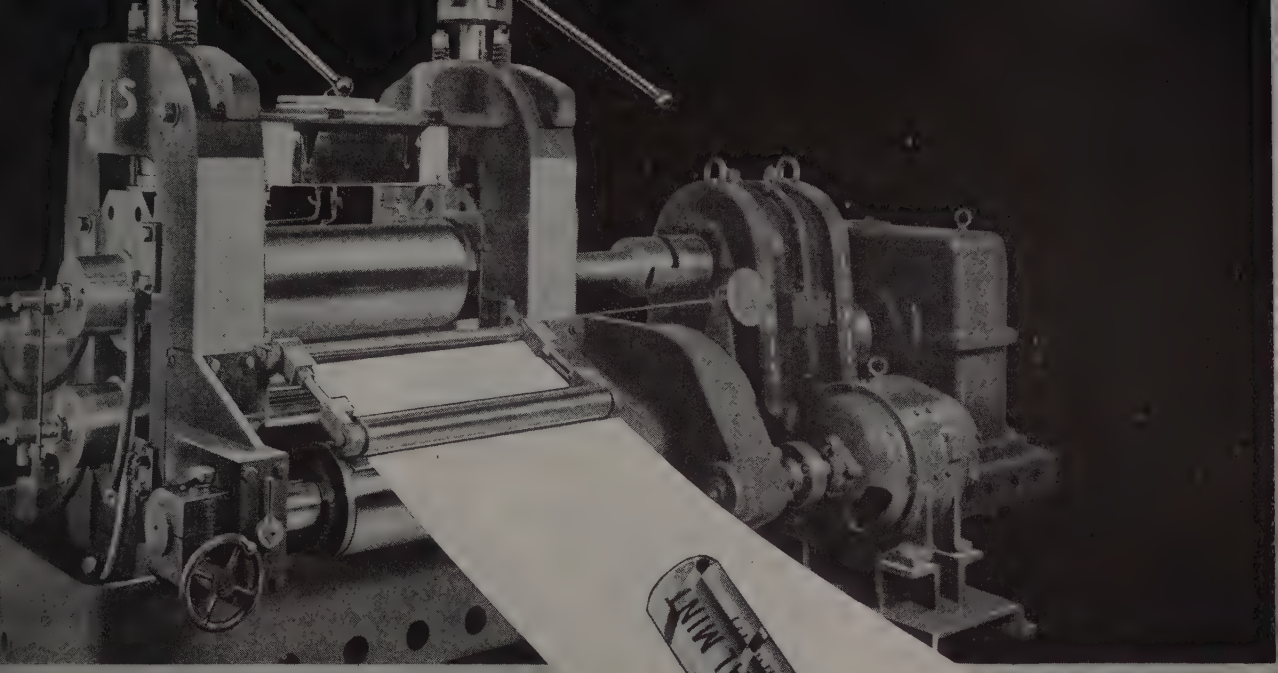
(5) A diagramming of the machine base to show size and location of foundation bolt holes and any machine bosses or finished surfaces on which machine will rest.

After these data are obtained, the curves shown in Fig. 15 which give the recommended loads for lengths up to 12 in., are referred to for the desired information. (Multiples of these loads require equivalent multiples of the recommended lengths.) By adding the impact loads to the static loads and considering their distribution, length of isolator required at the various concentrated load points can be determined.

The manner in which the recommended amount of vibration isolator is to be stalled under the machine is determi by: The size and shape of the mach base, the available means which b distribute the resultant of the several c centrated loads proportionately, and facility in installation. If deflection to be minimized, the correct amount 60 durometer should be used; the 50 a 40 durometer material successively crease this deflection. The 24 and in. lengths carry loads proportionat two and three times greater, respective than the 12 in. length for that particu durometer hardness shown on the l deflection graphs. (Inasmuch as t CA-148 isolator also employs synthe

TABLE VIII
LOAD RATING OF VARIOUS ISOLATORS
(Firestone Industrial Products Co.)

	Style	Load Capacity in Pounds Compression	Tension	She
Machinery Mountings	CA 1290	600–2300		
	CA 1595	300–1200		
	CA 244-5	100–350		
	Part #6-7-8	140–375		
Light Duty Mountings	DA 1089		26–60	
	DA 1090	19–50		
	DA 1079	25–110		
	CA 243	35–115	15–50	15–
Industrial Vibration Dampeners	1-in. Length	28–60	50	50
	2-in. Length	60–135	50	50
	4-in. Length	120–310	50	50
	6-in. Length	180–480	50	50
	12-in. Length	375–1000	50	50
Cushion Connectors	Standard	25	12	8
	Heavy Duty	50	25	25
	Type 160 A	35	12	8



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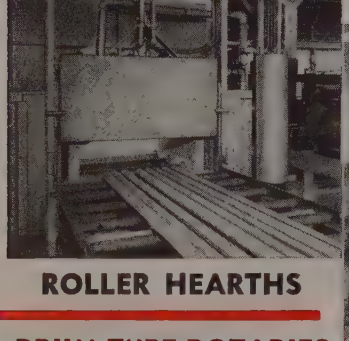

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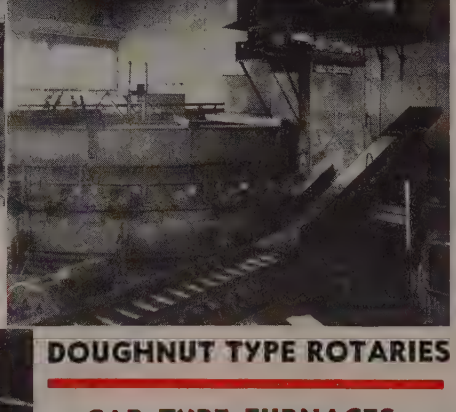

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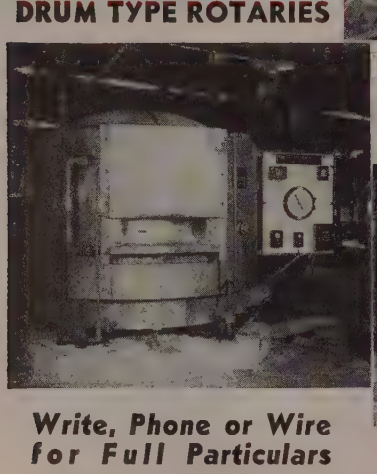

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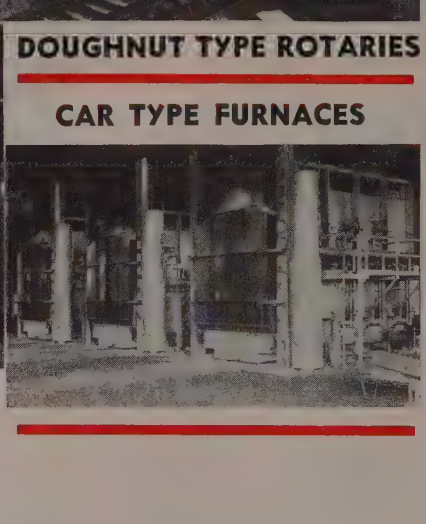

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stocks for mounting, and since char teristics of the stock may vary from to lot, the use of graphs (Figs. 15 and in this discussion is not to be construed mean that mountings can be selected the basis of load deflection characte tics presented therein.)

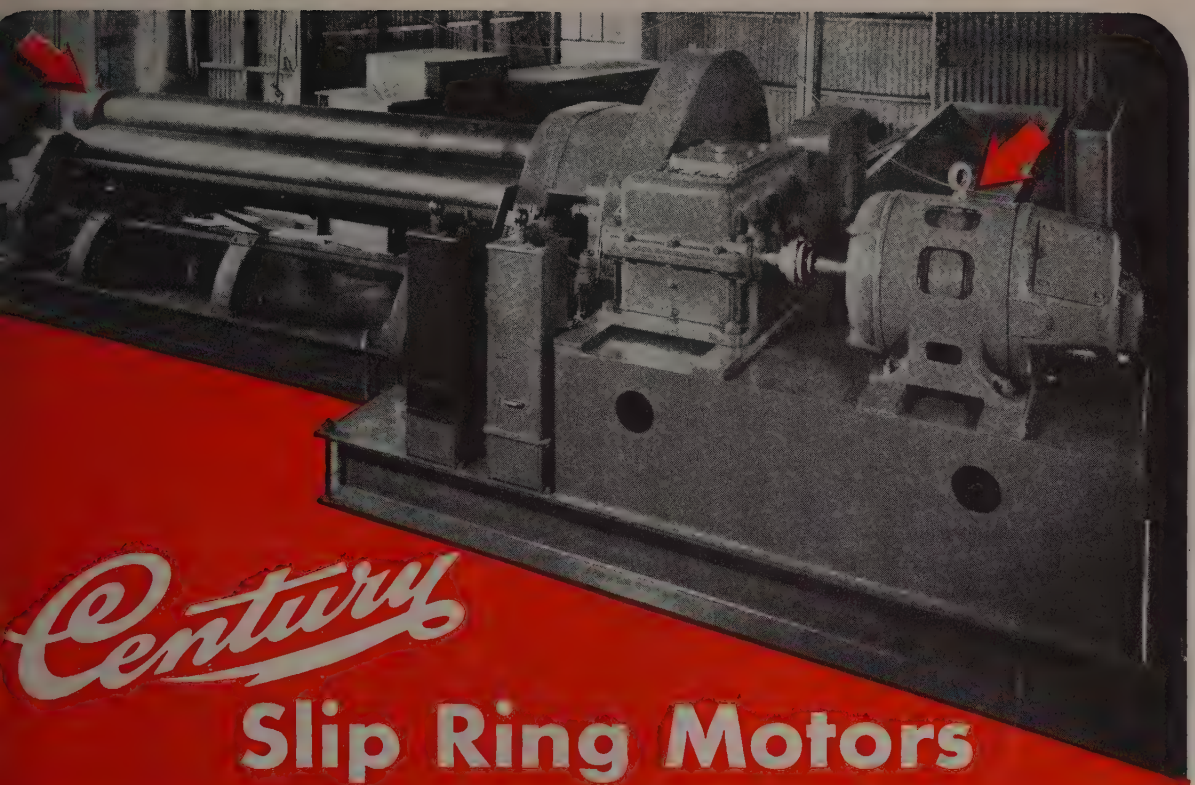
Oil and lubricants have a deteriorat effect upon rubber, and their cont with the rubber elements of the isolat must be minimized if not entirely eli nated. On installations where mach lubricants, bilge oil, etc. will come i contact with the rubber, it is rec mended that the entire surface of the bration dampeners be coated with a quer or varnish which is impervious oils and greases. The following coatin listed according to trade name and ma facturer, are suggested:

Egyptian Lacquer, Egyptian Lacq Co., New York, N. Y.; Forbes' Nitrol Lacquer, Forbes Varnish Co., Clevela Glyptal Lacquer, General Electric Schenectady, N. Y.; Ivco Varnish, pervious Varnish Co., Pittsburgh.

The General Tire & Rubber Co., chanical Goods Division, Wabash, I reports that for many years there been a great demand by manufactur plants for mountings to absorb vibrati shock and noise on machinery. Beca it was almost impossible to satisfy demand with isolators of conventio design, a mounting, known as indust rolling joint mounting, was developed use with a wide variety of types of chinery. The type of mounting is a n bonded rubber and metal combinati with crude rubber compounds being u for the resilient medium. Overall hei of the mountings is 2½ in. under no lo

Maximum load ratings of the isolat are given in Table IX, however, sh loads up to twice the maximum loads dicated can be absorbed. A minim deflection of approximately 0.250-in. obtained at the rated loads. The m mum disturbing frequency that can handled by these mountings is of cou related to the amount of deflection curring under load or in other wo the spring rate experienced. Spring of properly applied mountings is su ciently low to absorb vibrations of cps. In special applications, disturb frequencies lower than this value can handled.

In addition to this mounting, the ot types available are: Plate type mou ings in square, diamond, round, squ cup, and round cup shape; well t mountings; pedestal style supports; platform type mounts. Both the p form and pedestal type mounts are isolating heavy machinery from bu ing foundations and are available i wide range of sizes and capacities. F 18 (A), (B), and (C), show, respectiv



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In the installation shown here two Century Slip Ring Motors have been correctly applied. A 20 horsepower Slip Ring Motor drives the plate rolls and a 7½ horsepower motor raises and lowers the rolls to regulate the curvature of the plate that is bent.

These motors have the ability to start heavy loads with a minimum of starting current and the speed of the motor may be controlled to compensate for varying thicknesses of metal plate.

Another advantage of Slip Ring Motors is that the direction of rotation may be readily reversed when application requirements make it necessary.

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plate style holders of square and square cup shapes, and a well type mounting. Range in capacity of the well type of mounting is from 20 lb with a rated deflection of 0.065-in., to 1450 lb with a deflection of 0.123-in. Load ratings for the plate type mountings range from 1 to 45 lb.

International Balsa Corp., Jersey City, N. J., reports that balsa wood has been used for many years to dampen vibration in machinery. In its natural state, balsa will absorb moisture if placed in water or in a damp location. A simple waterproofing treatment will prevent this. It will take paints, varnishes, dope, etc., and these can be applied by the use of ordinary methods. If the wood is kept dry it will not rot. Chance Vought Aircraft, Division of United Aircraft Corp., furnished Fig. 23 and the following information pertaining to this illustration:

Undamped natural frequencies are shown for three densities and three different cuts of the material. The curves are standardized for a 1-in. thickness. Desirable thickness is necessarily determined by the application, and the effect of thickness on natural frequency is indicated in Fig. 23. The ultimate strength, U, and proportional limit, P, are spotted on each curve.

B. F. Goodrich Co., Industrial Products Division, Akron, O., suggests the following procedure for the selection of isolators made by the company: (1) Find the lowest disturbing frequency of the machine. This is usually the revolutions per minute or the number of impacts per minute. Many machines produce disturbing vibrations in more than one frequency. In such a case, use the lowest disturbing frequency when selecting the isolator. An isolator which is proper for the lowest frequency will be still more effective of insulating higher frequencies.

(2) Find the correct loaded weight of the machine.

(3) Determine the distribution of weight. (Where weight distribution cannot be correctly determined, refer number and model of the machine, together with the manufacturer's name, to B. F. Goodrich so that this important point can be correctly figured.)

(4) Refer to Table X and select an isolator with a frequency as low or lower than the lowest disturbing frequency of the machine. This will make a satisfactory installation when loaded to capacity with even distribution of weight.

Efficiency of the isolators is affected not only by the total weight applied, but also by the distribution and arrangement of the mountings to match distribution of weight in the machine. Maximum capacity of each type is given in Table X. It is important that instructions for each type be followed carefully. This results in a uniform deflection of each mounting which is necessary for most satisfactory results.

Uniformity of load distribution is essential for the following reasons: (1) Prevents overloading of some mountings with possibility of causing these to fail prematurely; (2) insures more efficient isolation because mountings that are not fully loaded decrease the effectiveness of the whole installation; (3) uniform loading will prevent sagging and keep machine in proper horizontal position.

When tall, narrow, top-heavy machines are to be isolated, the mountings should be placed as far apart as possible to give added stability. The type 10 mounts provide increased stability when placed with their length at right angles to the direction of the rocking motion. Wh objectionable horizontal motion is p ent, the mounting should be placed that it resists this motion. It frequer helps to place the mountings so that t are braced against the machine, but attached to it. In this position, they sist the horizontal motion without ca ing any weight.

The mountings should be protec from prolonged contact with oil, t peratures over 150° F, and from co sion of the metal parts. Protection f excessive oil may be obtained wit shield, an occasional small spattering oil does little harm.

Korfund Co., Inc., Long Island, N. reports that impact machinery need longer be placed away from produc lines in order to protect precision equ ment from harmful vibration. Cork, r ber and steel spring resilient mounti permit hammers and large presses to installed where forgings and stampi are needed for the next operation. fact, they can be placed anywhere most efficient production with absolu no vibratory interference to adjacent cision equipment.

There are two courses which can followed in eliminating costly dam from vibration within the plant. most satisfactory method is to isolate offending machine itself by means of s able antivibration equipment, and eliminate the transmission of vibra completely. When existing machin cannot be taken out of production is possible to isolate instead, the cision equipment that is affected by disturbing vibration.

Since many impact machines req the stabilizing effect of an inertia n in addition to correct vibration con Korfund has developed enginee methods to fulfill this requirement. far as theory of vibration is concer isolation of machinery on concrete fo dations presents no greater problems t isolating directly at machine bases legs, except for the increased wei Practically, however, certain additi factors must be considered, such as cessibility of isolators for adjustment, proper design to meet physical lim tions of installation below floor le Also, it is essential that anti-vibration gineering be conducted simultaneo with foundation design since vibra control must become an integral par the whole, and proper allowance n be made for it both before and du construction.

Fig. 24 shows one of the methods veloped by the company for the us inertia blocks. The machine is mou on a concrete foundation in which is bedded a structural steel chassis, jecting ends of the chassis are bo

TABLE IX
RECOMMENDED APPLICATIONS
(B. F. Goodrich Co.)

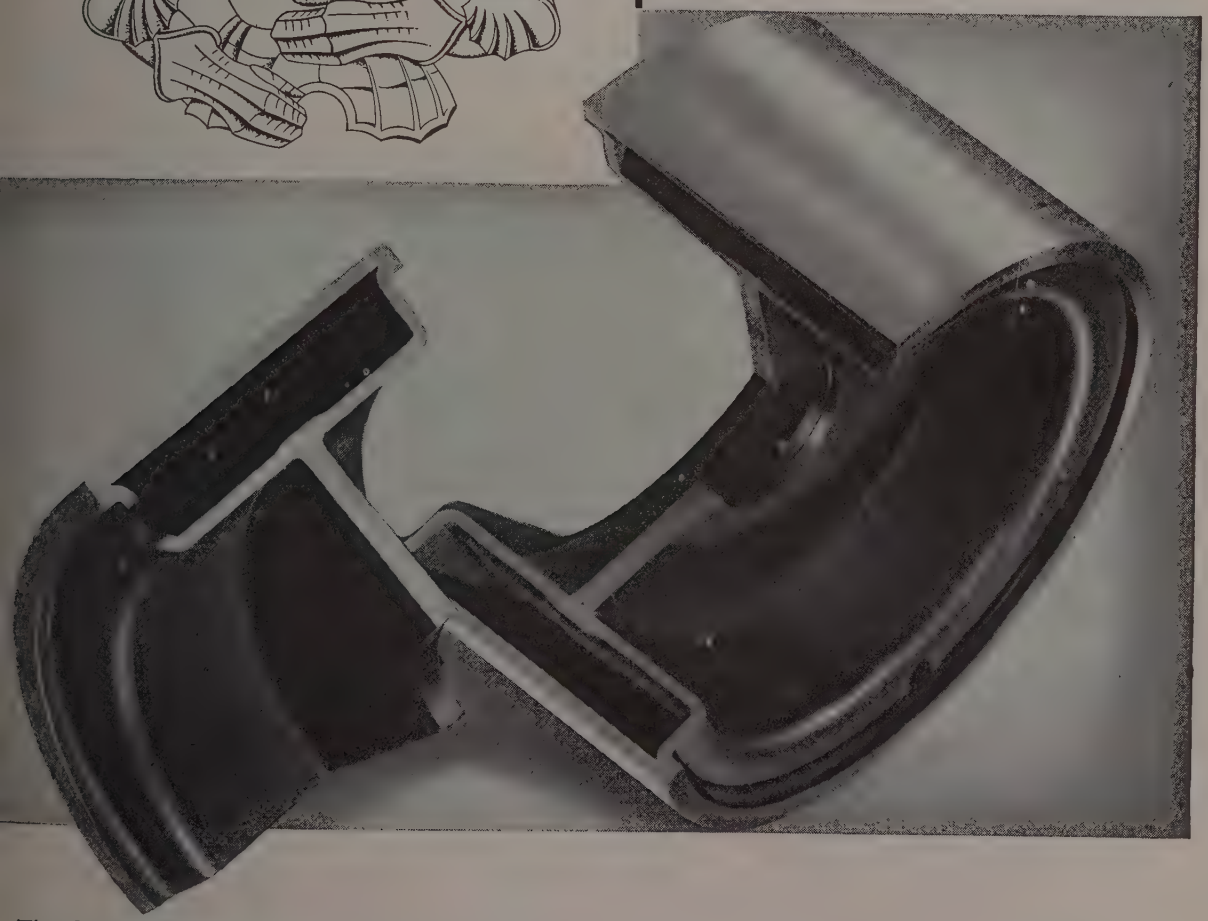
Service	Isolator Type
Electric Motors (large and small)	10, 30, 40, 60
Air compressors	12, 60
Punch presses	1, 12
Internal combustion engines (gasoline and diesel)	1, 50, 60
Ventilating fans and blowers	10, 12
Heavy Mills	20
Vibrating screens	1
Motor-generators	10, 12
High speed grinders and buffers	10, 12
Slow speed roll grinding machines	12, 14
Wire drawing machines	10, 12, 14

TABLE X
CHARACTERISTICS OF ISOLATORS
(B. F. Goodrich Co.)

Type	Deflection at Maximum Load, In.	Maximum Load, Lb.	Durometer hardness	Minimum Disturbing frequency
1	0.170	400 each	40	1000
10	0.1875	50 per in.	45	1000
12	0.50	75 per in.	40	600
14	1.00	80 per in.	40	470
30	0.1875	110	40	1200
130	0.1875	132	45	1200
33	0.15625	150	40	1200
133	0.15625	180	45	1200
36 Shear	0.250	30	40	1000
Comprs'n	0.175	125	40	1250
40	0.15625	10	40	1200
44	0.15625	10	40	1200
144	0.1250	60	45	1350
60	0.1875	175	40	1000

WORCESTER PRESTEEL

Presteel Produces an Unusual Welded Flywheel



The flywheel shown here is an unusual stamped-welded assembly. It measures 7 inches in diameter, and must be filled with mercury before installation to provide the desired weight.

As the sectional view shows, the assembly is made up from several drawn shapes and requires both spot and autogenous welding to insure a mercury-tight closure. Presteel then precision-grinds the O.D. and end faces to provide perfect balance.

Such work requires more than ordinary press experience, making it "A Job for Presteel."

As you look forward to your future stamping problems which require skill and ingenuity plus unusual stamping facilities, think of Presteel.

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to spring isolators placed in pockets in the surrounding sub-base. Thus, the entire weight of machine and foundation is resiliently suspended on the isolator springs. The operator stationed on a metal platform spanning the machine foundation feels no shock or vibration. This type of vibration control is particularly adaptable to large and heavy installation, where maximum simplicity of foundation construction and isolator accessibility are required.

An alternate method of foundation suspension providing all six degrees of freedom is shown in Fig. 25. This type of arrangement is particularly suitable for installations on which forces and moments may act in all directions. In this design the projecting ends of the steel chassis are fastened to the ends of suspension rod which in turn are bolted to the spring isolators. The pendulum action of the units insures high efficiency and stability for such conditions by locating the spring unit and fulcrum of pendulum on a plane close to the center of gravity for both machine and foundation.

A simplified method has been evolved for installing these spring suspended concrete foundations: A concrete substructure consisting of a base and walls is constructed to form a pit in which the suspended foundation is positioned. A layer of asphalt felt is then placed over the concrete surface to prevent bonding with the concrete of the suspended foundation block. Spring saddles are placed in pockets in the substructure, and then the steel channels, which extend through the foundation, are fitted over these saddles. After the foundation block has been poured, the other parts of the spring units are inserted and bolted securely to the channels.

Adjusting bolts are then screwed into the isolator top plates. By screwing down these bolts, using them as jacks, the entire foundation is raised and "floated" on the springs. Raising the foundation is thus a simple task requiring a comparatively short time even for a fairly large foundation. Then the machinery is installed and the foundation is carefully relevelled and adjusted for load distribution.

A complete concrete foundation can be moved when relocation of a hammer in the production line becomes necessary. For example, in one typical installation the concrete inertia block measured 10 x 10½ x 7½ ft and weighed 150,000 lb. A crew of ten men with ten Simplex Step Jacks, of 20 t capacity each, lifted the block from its original position and lowered it into the newly prepared pit with a minimum of lost product Hauling was done on a low-bed, he duty, semitrailer truck.

Isolators are also available for with hammers, shears, punch presses other impact machines which do not quire inertia blocks (see Fig. 21). stalled directly between the base of machine and the floor, these isola provide control of vertical and lat vibration. Steel springs for vertical c trol and inserts of self-adjusting, resili material for lateral control are used combination. Bolted to machine and fl they are accessible for spring adjustm

(*Concluded next week*)

Compiles Cutting Fluid Da

A 36-page symposium on cutting fl as presented at the American Society Tool Engineers New Era Exposition subject of technical bulletin No. 5 "C ting Fluids and Coolants." distributed D. A. Stuart Oil Co. Ltd., Chicago.

Text consists of four technical pa presented by leading authorities in cutting fluid field covering the follow subjects: "What the Tool Engi Should Know About Cutting Flui "Testing of Cutting Fluids"; "Cut Feeds and Speeds;" and "Selection Cutting Fluids."

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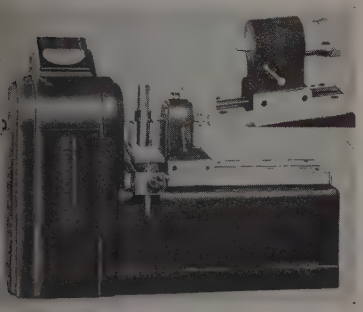
. External Comparator

Permitting quick, accurate measurement of rectangular, threaded or cylindrical parts, tapered or straight, within range to millionths of an inch, the horizontal external comparator, announced by Sheffield Corp., Dayton, O., adjustable to 3½-in. high and zero to 1½-in. in length. Features include adjustable pressure attachment, removable elevating table, Sheffield Electrigage head and choice of standard or micrometer tailstock. Use of micrometer tailstock

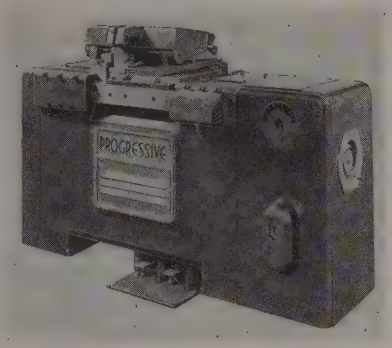


on applications below 1 in. permits readings of 0.0001-in. from calibrated barrel without use of gage blocks. If full accuracy is desired, micrometer may be set at zero, gage blocks used for setup, and readings in millionths obtained from the Electrigage, which is available in amplifications of 100 to 1, 500 to 1 and 5000 to 1.

2. Flash Welder

Designed for precision flash welding of virtually any metal, including aluminum, for long periods at high production, a new line of motor-driven flash welders announced by Progressive Welder Co., 3050 East Outer drive, Detroit 12, may be operated on alternating current through transformers or on direct current through use of storage batteries.

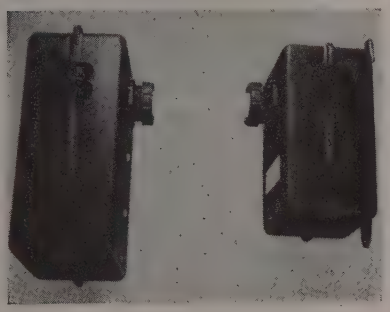
All welders are enclosed, and controlled from one position. Platen travel speed for flashing and upset; flashing voltage; amount of upset; die openings and other settings can be made in a few minutes. Welding speed is increased by close coupling of welding current. Multistep



taps on transformers permit 16 distinct steps from 30 to 100 per cent capacity. Welders are available in four capacities from 20 to 150 kva. Welder illustrated here is the 50 kva model. Upset pressures are 2250, 4500, 11,500 and 19,600 lb for the four machines.

3. Smoke Indicator

Photoelectric smoke indicator, type A20C, developed by Photoswitch Inc., 77 Broadway, Cambridge 42, Mass., indicates the density of smoke passing

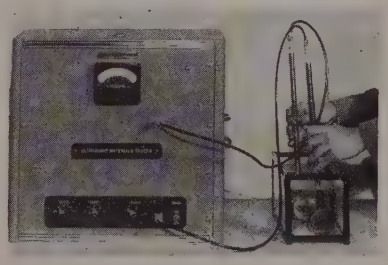


through the flue or breaching of a heating or power plant, and signals when this density approaches the values prescribed by smoke ordinances. It is basically a photoelectric control and light source, mounted on opposite sides of the flue. Light beam is projected across the flue onto the photoelectric control.

A sensitivity adjustment permits the equipment to be set so that it will signal when smoke density approaches whatever value prescribed. Supplementary equipment includes bell alarms, densometers, and recorders. Unit operates on 115 v ac.

4. Materials Tester

Presence of voids, cracks, porosity, laminations, poor bonds and other internal flaws in metals, plastics and ceramics is



indicated with the ultrasonic materials tester being marketed by General Electric Co., Schenectady, N. Y. In testing metal castings, forgings and finished machine parts, it sends a beam of ultrasonic waves through the specimen. Changes in amount of energy transmitted through the specimen are an indication of the presence and extent of flaws.

Instrument is portable, self-contained and gives a direct reading. It consists of a complete wide-band ultrasonic transmitting-receiving system having a high frequency generator, crystal transducer for producing ultrasonic vibrations, a medium to transmit these vibrations, a second crystal transducer to convert the received mechanical energy into electrical signals and an indicator supplying information for materials inspection. To examine regularly-shaped specimens, the two transducers are immersed in a tank containing water and specimen inserted between them. Ultrasonic waves are then

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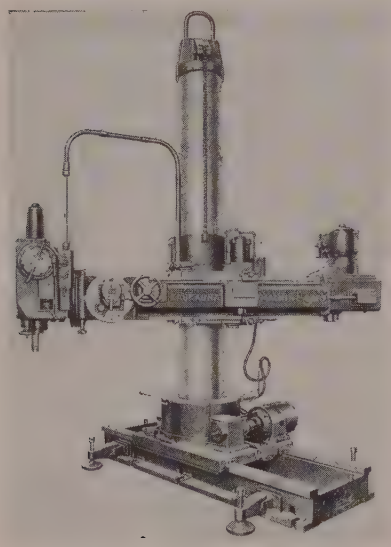
sent through the specimen, the reading being compared with that for a specimen shown to be sound by x-ray or other sectioning methods. Instrument can also be used to indicate changes of viscosity, compressibility and density of liquids.

5. Tapping Machine

Series 125 portable universal horizontal drilling and tapping machine, made by Kaukauna Machine Corp., Kaukauna, Wis., drills and taps at any conceivable angle, in any plane within the maximum



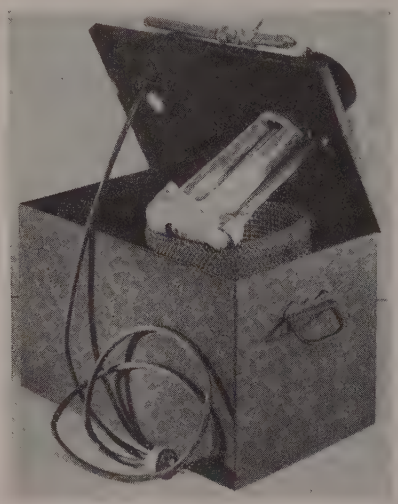
and minimum limits of travel or movement of the machine. The portability, flexibility of operation and operating range of the machine allows it to be moved to bulky and unwieldy workpieces. Head swivels 360 degrees in either vertical or horizontal plane.

Headstock of the machine is positioned on two individually controlled axes to permit head to swivel 360 degrees on a trunnion, and trunnion to swivel 180 degrees. Two rails, supporting trunnion, have a 24-in. horizontal traverse, while spindle has a 12-in. travel. Rail also may be swiveled 360 degrees to perform machining operations at any point around the machine. Work is held on an indexing table, permitting work to be rotated to present five surfaces to the machine. Three spindle speeds are provided and drive to spindle consists of a 9-speed gear change box. Dual controls facilitate operation.

6. Filtering System

Inject-A-Flow Pump Co., 67 North Willow street, Montclair, N. J., recently developed a self-contained filtering system designed to remove fine metallic particles in suspension in liquid coolants used on machine tools. Strainer medium excludes extremely fine particles without creating back pressure that would reduce the flow of coolant to the cutting tools.

System consists of a 7-gal rectangular steel tank in which a Strainco strainer unit

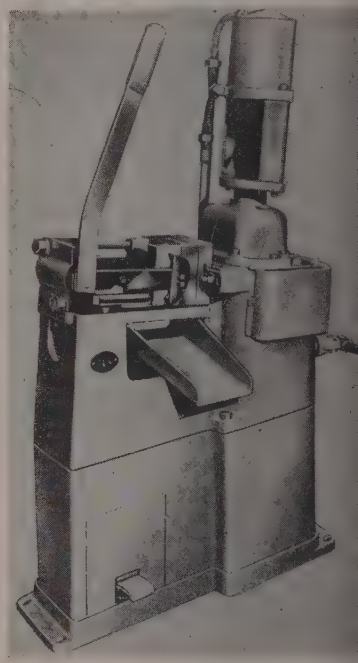


is mounted. Pump unit is mounted on lid of tank with pump operating inside the strainer unit. Pump unit consists of a precision cast noncorrosive centrifugal pump connected to motor through an extended shaft. Provision is made for recirculating coolant liquid. The system is

equipped with 4-ft flexible metallic h and a bronze flow control cock, toget with necessary wiring, switch, etc.

7. Die Casting Machine

An air-operated die casting machi for manufacturing small parts at hi rates of speed is anounced by DC Sales Corp., 315 Broadway, New York Operational speeds up to 1500 shots hour have been reached, using sing



cavity molds. The company offers p chasers of machine engineering serv which includes die designing, die maki field and production engineering. D made for customers will be tested a run on machines before delivery.

8. Steel Fabricated Motor

Fabricated entirely of steel, a new l of electric motors manufactured by Ell Co. of Ridgway, Pa., has increased se ice life and is low in maintenance. Ligh weight motor is extremely rigid due welded all steel construction. Motor fra consists of end plates of 1 in. minim thickness welded to heavy longitudi angles supporting stator core. Baffling large air openings give motor direc ventilation without recirculation. Th steel plates are coated inside and out w a rust preventive. Conduit box, adjusta to four positions, has knockouts for f conduit sizes.

Maintenance is eased as bearings quickly and easily inspected and remov Rigid steel bearing bracket gives a bearing support, maintaining uniform gap, preventing vibration and withsta

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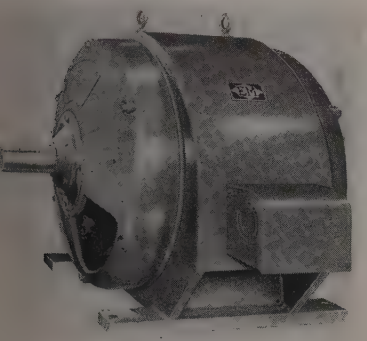
g shock. Thin babbitt liner stands up nder rough treatment and heavy pound-g. Liner is supported by a bronze bear-g shell to which it is bonded.

Motors are available in standard rat-gs of 150 to 1000 hp, 4 to 14 poles, with ly five frame diameters required for ntire line. All are dripproof and splash-roof and adaptable to forced, pipe or ase ventilation and with sleeves or anti-iction bearings for coupled or belted rvice.

9. Squirrel Cage Motor

Drip and splash-proof squirrel-cage in-uction motors such as the one illustrated ere, for large power drives from 100 to 000 hp and 1800 rpm and lower speeds re being manufactured by Electric Ma-inery Mfg. Co., Minneapolis 13. Their



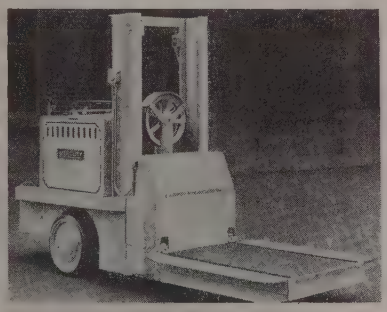
abricated steel frame shuts out falling articles, makes operation quieter and acilitates cleaning. Inspection and blow-g out is simplified on larger ratings with ccess plates designed for easy removal. ealed bearings may be cleaned and re-lled without motor disassembly, and ouble end ventilation is provided by a lower on each end of rotor. Starting haracteristics are NEMA class B (nor-al torque, low starting current) for ross-the-line starting.

10. Drafting Scale

Eight different scales are incorporated n one side of the transparent plastic rafting scale, the Vant rule, manufac-ured by Stewart-Jackson Co., Los An-eles. The 0.125-in. thick instrument need ot be turned over to find calibrations of , ¾, ⅜, ½, ¾ 1, 1½ and 3 in., per foot. Calibrations and numerals are in red to facilitate reading against black and white drawings or blue prints. Overall length is 13½-in. with scales reading to 12 in.

11. Die Handler Assembly

New die handler assembly is built into a Mogul 5-ton high lift chassis or the Mercury 3-ton high or low lift chassis, all products of Mercury Mfg. Co., Chicago. Design consists of two power-driven die movers, operating in machined



slots at the sides of the load platform. Each is driven by a compound wound direct current motor through a Brad Foot Gyro speed reducer and roller chains. Independent control is effected by two push-button - operated magnetic contactors. Push buttons are located on operator's dash. This assembly makes it possible for operator to push die from the load platform onto the press or storage rack or vice versa. Independent mover control makes die spotting a simple matter. They may be retracted for skid handling by the truck.

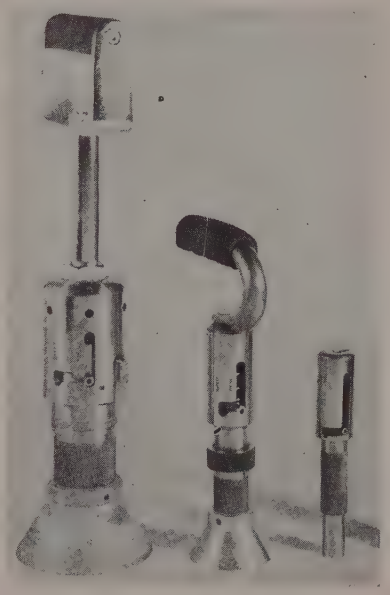
12. Adjustable Tool Gage

An inside micrometer caliper tool gage for all inside measurements, including inside screw thread, counterbore, groove and recess measurements is announced by U. S. A-C-E Tool & Gage Engineers, 827 South Hoover street, Los Angeles 5. It is made in two sizes: Type E, 3/16 to 2½-in., not graduated; and type A1, 13/32 to 4 in., graduated in 0.001-in. Its sensitive touch makes it possible to make close fits to within 0.0001-in.

Gage is easy to adjust for wear and has a locking nut. It is hardened throughout and has a ball bearing adjustable head. Gage is made in several lengths and with various attachments.

13. Fastening Tool

Utilizing the explosive power principle, the Tempotool, developed by Tempo Products Co., Cleveland 13, simplifies operations where it is necessary to at-



tach steel to steel or steel to concrete. Especially useful in the installation of electrical conduits and junction boxes, the tool derives its power from an exploding blank cartridge in an enclosed chamber or breach.

Explosive drives a pin or stud through the short barrel and into steel with such force that it is firmly "set." Tests show

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studs to resist a direct pull of up to 20,000 lb, this varying with type of tool used, the power cartridge employed and the hardness of the steel. Company is offering three models—the "22" for attaching metal objects up to ⅛-in. thick to steel or concrete, the "38" which can be used with mild steel up to ⅝-in. thick, and the "45" for use on heavier jobs requiring penetration of mild steel up to 1¼-in. thick. Cartridge charges of three different powers are available for the "38" and "45" models.

14. Air and Water Gun

Lightweight air and water gun that is completely controlled by a finger-tip lever without valve adjustments is being introduced by Turco Products Inc., 6135 South Central avenue, Los Angeles 1. Designed

for high-pressure rinsing and removal of loosened dirt and grease from inaccessible parts of equipment and machinery, this gun operates on regular air and water pressures and connects to standard fittings. It fits snugly in the hand of the operator, who merely depresses a single lever to produce automatically a high-pressure spray.

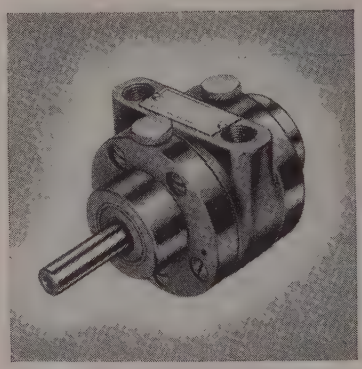
15. Diaphragm Motor Valve

New design in diaphragm motor valve construction is announced by Fischer & Porter Co., Hatboro, Pa. Design features include dished-bonnet construction with flush-seated bodies and through-bolts. No bonnet flanges are included in the body construction, design resulting in compact unit with the low weight, simplified cleanout characteristics and the possibility for fabrication in nearly all corrosion resisting materials. Valve, referred to as the Valvrator, is made only in 150 lb construction in sizes from ¼ to 1 in. screwed, and from 1 to 3 in. flanged.

16. Air Motor

Gast Mfg. Co., Benton Harbor, Mich., announces a model No. 1 explosion-proof air motor weighing 2½ lb and measuring 2¼ in. in diameter.

By centrifugal force, four one-piece sliding vanes, fitted in a shaft-mounted

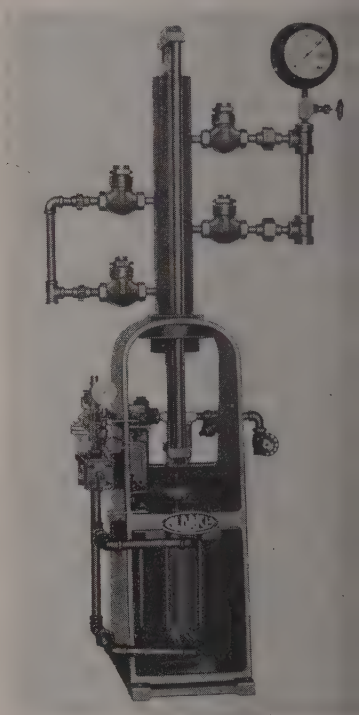


rotor, slide outward in a shell, presenting their surfaces to the incoming air, to cause rotation. The motor starts in any position, will not spark, burn out due to overload, or sudden braking. It runs under constant low speed, as 100 rpm, without stalling. Speed varies from 0 to 6000 rpm, horsepower from 0 to 1/16.

17. Hydraulic Pump

Manufactured by Aldrich Pump Co., Allentown, Pa., the Aldrich-Lytle Hydropneumatic power unit is a simplex, double-acting hydraulic pump, powered by air. Built to provide low volume—high pressure service, its initial and operating costs are low and troubles with "wire drawing" through relief valves, as well as the need for constant adjustment, are eliminated since the pump stalls when the desired hydraulic pressure developed corresponds to the pressure used.

Power is derived from plant air pressure or from a small commercial air compressor. Various pressures can be obtained by adjustment of air pressure reducing valve. Unit is operated by vertical double-acting air cylinder a



piston that is direct-connected to upward-acting pump plunger and yo connected to the downward-act plunger.

Suitable for use with hydraulic pres in small molding press plants, the pu gives approach at maximum speed wh automatically reduces as maximum pr sure is reached.

18. Audio-Amplifier

Thordarson Electric Mfg. Division Maguire Industries, Huron and Kin bury streets, Chicago, announces anot series 1000 w audio-amplifiers for as a vibration tester. Harmonic dist tion and frequency deviation are h to a minimum of from 25 to 1500 with an overall gain of 96 db, at an put impedance of 100,000 ohms. hum level is held 48 db below output. Extended frequency ranges available upon request.

Enclosed cabinet of the instrum safeguards all operating controls provides the operator with a clear vi of output meters and critical circ meters. A complete circuit interlock

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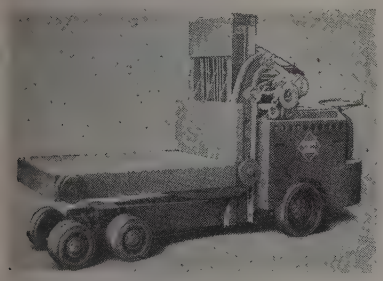
door system protects the operator from high voltages. Maximum tube life is insured by overload and time-delay relays with pilot lights to show operating conditions. Further protection against overload is afforded by a power output limiting circuit. Automatic cooling is provided by blowers.

19. Die Handling Truck

Trend toward use of larger power trucks for handling the heaviest types of dies is exemplified in the industrial truck built by Elwell-Parker Electric Co., Cleveland, with a rated capacity of 25 tons. In changing a die with the new power truck the platform is elevated to the level of the press bed. Cables wound



on power-operated reels on the left and right sides of the truck pass under pulleys on the truck's upright columns and are hooked together at the far end of the die. When cables are reeled in the side slides off the bed onto the platform.

In replacing a die the action is virtually the same, except that the cables are passed under the pulleys at the forward end of the platform and are then brought back and hooked behind the near end of the die. Truck platform is 53 in. wide, 72 in. long.

20. Enclosed Safety Switch

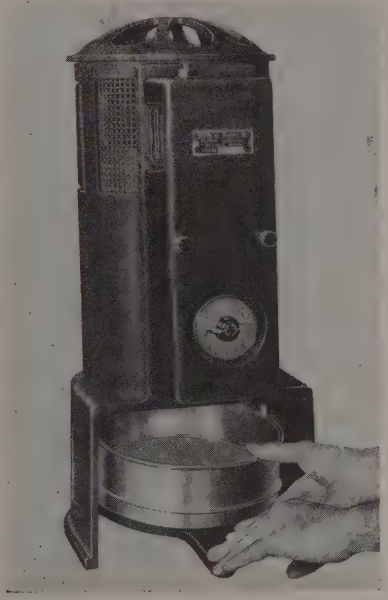
Trumbull Electric Mfg. Co., Plainville, Conn., announces a type D enclosed safety switch which is rated at 30 amp. Its enclosure measures only 4½ in. wide, 6⅛ in. long and 3¼ in. deep.

Switch features front operation, and its attached triple duty spring takes up any loose tolerance in the switch. Spring also provides a flexible connection to movable contacts, as well as a seal between handle and cover. It is designed so that pivoting lever may be padlocked in the "off" position to prevent opening of the switch or cover.

Design gives the switch sufficient wiring room and provides easy access to terminals. The entire switch mechanism, mounted on the back of the box, may be removed by loosening a single screw. It is available in 2 pole, 125 v, 3 pole solid neutral, 125/250 v, 3 pole solid neutral with meter twist-out 125/250 v and 3 pole solid neutral, 125/250, 230 v, ac.

21. Moisture Determinator

Quick drying moisture determination unit for either plant or laboratory use which uses an 8-in. diameter drying pan of various depths for flexibility in selection of sample size is offered by Harry W. Dietert Co., 9330 Roselawn avenue, Detroit 4. Model 278 Moisture Teller unit is provided with automatic tempera-



ture control ranging from 150° F for materials sensitive to drying temperatures, up to 300° F for drying materials that require higher temperatures. It has a ball-bearing motor and fan which drives air past large size wire heat resistors which heat air to temperature selected. Moisture evaporated into heated air is passed through the Monel metal filter cloth bottom of the sample pan. Sample is weighed before and after drying to obtain precise moisture percentage reading.

22. Plastic Molding Machine

Utilizing electronic controllers for regulating heat in chamber and nozzle, a plastic injection molding machine, Model IM-2, manufactured by Hydraulic Machinery Inc., Dearborn, Mich., has a temperature accuracy of plus or minus 2 F. Mold clamping is achieved by a toggle action. In closed position, mold comes against stops to prevent misalignment. Platens are adjustable to hold die of a minimum of 5½ in. to a maximum of 9 ½ in.

Maximum pressure of injection plunger is 28,400 lb when operating at 1000 lb line pressures. Injection stroke has a 3 sec cycle for full 8 in. All controls are electric and located in one panel.

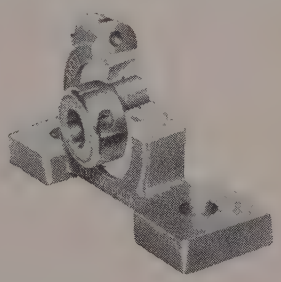
23. Gas Unit Heater

New Palmaire suspended unit heater, made by Palmer Mfg. Corp., Phoenix, Ariz., is designed to hang from ceiling and permits full use of factory floor space for equipment. No central heating plant is required for its operation.

Approved by American Gas Association, the heater is a modernized, one-piece welded unit of heavy gage steel. Its air deflectors are adjustable and a sliding, drawer type assembly for the controls and burner make heater easy to keep clean. It can be equipped with thermostatic control to provide automatic temperature regulation. Fan type unit, with output rating of 100,000 Btu, is now in production.

24. Pillow Block Bearings

Anti-Friction Bearings Co., 2020 South Figueroa street, Los Angeles 7, is announcing pillow blocks with bronze bearing foot and flange designs. Their split high tensile strength aluminum housing



carries spherical naval bronze bearing. Ground adapter sleeve is inserted in bronze bearing so that one basic pillow block can serve a number of shaft diameters. Housing is clamped on spherical self-aligning bronze bearing after shaft has been located, giving a rigid bearing for taking either radial or thrust loads. This line, manufactured for speeds up to 5000 rpm, includes sizes from ⅝ to 3 in. shaft diameters in both pillow block and flange units.

25. Fire Extinguisher

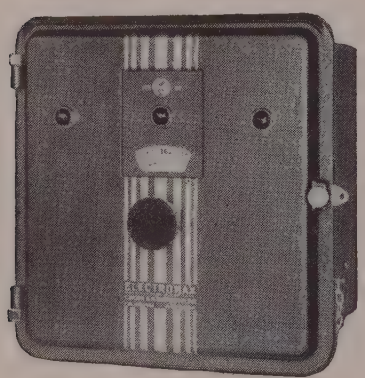
The Underwriters-approved, stored-pressure hand extinguisher manufactured by Union Stop-Fire Corp., Brooklyn, N. Y. is as easy to use as a garden hose. To operate it a user points the flexible hose at the fire and gives the valve a quick flick with the fingers, releasing an instantaneous stream of fluid. The hose attach-

ment enables a user to attack a fire in any direction merely by aiming the hose.

Carbon dioxide is combined with carbon tetrachloride and shot from the hose as a fine spray which is converted instantaneously into a heavy, fire-smothering gas. This is effective on oil, ether, gasoline and electrical fires. Extinguisher has a long range, the bulk of the stream traveling anywhere from 15 to 25 ft.

26. Temperature Controller

Designed for control of ovens, stills, baths, presses and coolants, the Electromax, developed by Leeds & Northrup Co., 4934 Stenton avenue, Philadelphia 44, fills the need for an alternating-current temperature controller of high sensitivity and versatility which needs practically no



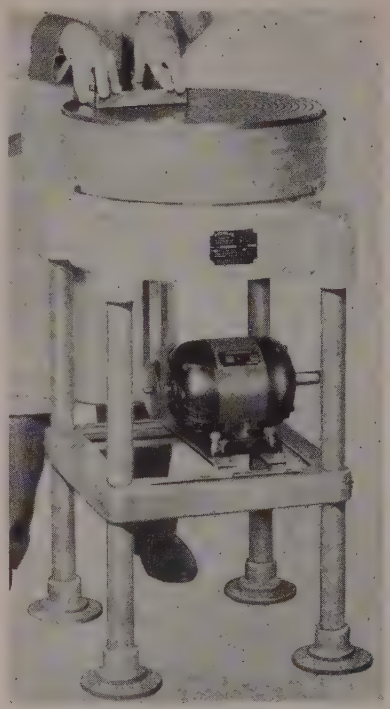
attention. It signals and controls only, although temperature readings may be taken manually.

Instrument consists of a Wheatstone bridge circuit with a vacuum tube amplifier as the detector. Tubes are standard type. Instrument is only 11 9/16 x 11 1/16 x 9 1/16 in. and can be mounted wherever convenient. Standard ranges are 0 to 250° F and 0 to 1000° F.

27. Finishing Machine

Midget-size Roto-Finish machine is announced by Sturgis Products Co., Sturgis, Mich. It is designed to permit greater time and labor economies in mechanical finishing and deburring very small parts.

Cylinders of machine are 8 in. wide, 12 in. across the flats. It has a variable drive of 35 to 70 rpm. Flats are lined with kiln dried hard maple, and ends are rubber sealed. Cover is secured to cylinder and cylinder mounted on machine by a lock and adjustable clamp that permits quick loading and unloading. It can be supplied without base for bench mounting. Interchangeable screens are available in all mesh sizes for separation of chips from parts.



28. Flat Lapping Machine

Perfectly flat planes necessary in sliding and rotating parts, air and liquid tight seals, drawing dies and pressure pads can be produced on the flat lapping machine built by Spitfire Tools Inc., 2933 Pulaski road, Chicago 41. Micro-inch readings as low as 2 rms are possible. Single pieces ordinarily require no holders, chucks or collets, the operator holding the piece on a revolving plate and directing the motion with his hands.

Machine is made with all gears and bearings sealed for life, lubrication being unnecessary. Extra lapping plates, standard or special, for various uses are available. These are installed without tools as plates utilize no fastening to hold them on machine.

29. Low Pressure Oil Burner

Compact and shipped ready for bolting into place on most any type of furnace, proportioning control oil burner, manufactured by Johnson Mfg. Co., 2825 East Hennepin avenue, Minneapolis, features an air and oil interlock that maintains the air and oil ratio constant at any setting between its high and low setting. It requires no regulation after it has been adjusted to produce the desired furnace atmosphere.

Various types of control motors can be used and are normally mounted on the burner to provide accurate control. Hookups are available for furnaces with several burners. Burner operates at 4 to 15 lb from line pressures of 20 to 40 lb

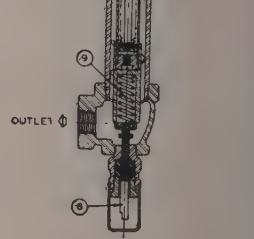
30. Drafting Instruments

A new line of drafting instruments is being marketed by Instrumaster Industries Inc., Arch street, Greenwich, Conn. One series consists of five stencils for axonometric drawing. One item, for isometric drawings, contains 27 ellipse openings representing circle from ⅛ to 2 in. in diameter. Another is the counterpart for dimetric drawings 1:1:½. Hi-Range stencils of same type, isomtric openings representing circle from ⅛ to 4½-in. complete the series.

Also in the new line are isometric protractors, floating triangles, hatching stencils, each offered in several models for various applications.

31. Steam and Water Mixer

Designed to eliminate the necessity of piping hot water long distances or installing separate water heaters and temperature regulators at isolated points a steam and water mixer, manufactured



by Sarco Co., 475 Fifth avenue, New York 17, solves the problem by installing it in a steam pipe. Its thermostat insures automatic temperature control as set by a key. An example of its capacity: 200 gph at temperature rise of 50 to 120° F with a steam pressure of 75 psi.

In operation, steam and cold water enter device through two valves, mixing in an injection chamber. Resulting hot water flows through housing to liquid filled thermostat actuating a plunger which shuts off steam when temperature rises above setting. Entire construction is brass with renewable valve heads and seats of stainless steel. Steam pressure must be 20 per cent higher than water pressure.

Booming Steel Operations Brighten Supply Prospects

Metalworking curbed by shortages but signs appear to indicate likely easing over next three months. Pig iron critically short. Scrap situation expected to improve soon

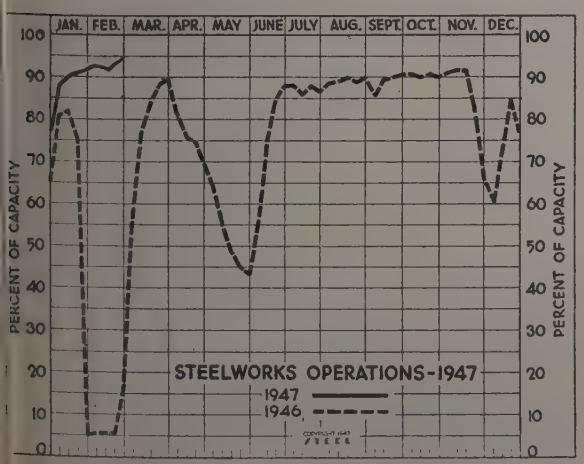
METALWORKING operations are held back by acute shortages of steel, but signs are appearing signaling the time is not far distant when noticeable easing in the tight market situation will be evident.

Steel production booms along at a peacetime record-shattering pace, and, if uninterrupted, supply pipelines for some products should begin to fill up over the next three months, accompanied by corresponding slackening in demand pressure.

Anticipating such easing, buyers are watching inventories with a sharper eye. At the same time, consumer resistance to quoted prices is developing, the so-called "black market" now presenting a noticeably weaker front with prices off three to five cents per pound. Also, talk is heard of a possible break in certain mill extras within the next few months. All this points to a definitely softer market situation in the making.

Broadly, supply is most stringent in sheets and strip, with plates close behind. However, except for alloy steels and certain specialties, notably wire rope, steel product supply generally still falls far short of demand. Little hope is held out for appreciable betterment in flat-rolled products before late year at earliest. Plates are in similar position, and heavy railroad car allocations may necessitate diversion of some strip capacity to plate production at the expense of sheets and strip.

Pig iron is critically short. Housing allocations have diverted such large tonnage from normal channels that widespread shutting down of foundries is threatened with accompanying curtailment of assembly operations depending on castings. Foundry operators are pressing for removal of all allocations. Indications late last week were that mandatory allocations would be abandoned in favor of a voluntary plan patterned after that in effect in distribution of steel for the railroad car program.



DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Feb. 22	Change	Same Week 1946	Same Week 1945
Pittsburgh	100	+ 2.5	17.5	88
Chicago	92	None	24	99.5
Eastern Pa.	89	None	13	91
Youngstown	89	None	20	92
Wheeling	87.5	+ 3	63	97.5
Cleveland	93	+ 2	17	90.5
Buffalo	90.5	None	23.5	90.5
Birmingham	99	None	12	95
New England	92	+ 2	45	90
Cincinnati	96	+ 6	70	87
St. Louis	69	None	19	80
Detroit	92	None	34	88
Estimated national rate	94.5	+ 1	16	96

Based on weekly steelmaking capacity of 1,762,381 net tons for 1946; 1,831,636 tons for 1945; 1,791,287 tons for 1944.

Strong undertone continues in scrap. Prices are still tending upward at various points. The market is disturbed by the maldistribution of available supply, tie-in sales and special deals between steel consumers and the mills. Actually, supply is fairly comfortable, the January steel ingot rate indicating consumption of 2 million tons of purchased scrap that month, close to wartime record. In the scrap trade predictions are made that if current maldistribution is corrected, the tight market will disappear within 60 days in view of the current high rate of industrial scrap production and prospects for improved collections as the weather improves.

Steelmaking operations increased last week to highest level since May, 1945, at 94.5 per cent of capacity. This was equivalent to 1,646,000 tons. Previous peacetime high was 97 per cent in November, 1940, when volume output amounted to only 1,472,319 tons. Capacity that year was smaller. Operations at Pittsbugh last week rose to rated capacity, a gain of 2.5 points, while at Cincinnati the rate went up 6 points to 96 per cent. Advances of 3 points at Wheeling to 87.5 per cent, and two points at Cleveland and in New England to 92 and 93 per cent respectively, were recorded. At other producing points operations held unchanged from the preceding week.

Price adjustments continue. Last week revisions were effected on cold-finished spring steel and alloy pressure tubing. STEEL's composite price averages held unchanged last week at the revised figure of $69.73 for finished steel, $52.10 for semifinished steel, $29.56 for steelmaking pig iron, and $33.75 for steelmaking scrap.

COMPOSITE MARKET AVERAGES

	Feb. 22	Feb. 15	Feb. 8	One Month Ago Jan., 1947	Three Months Ago Nov., 1946	One Year Ago Feb., 1946	Five Year Ago Feb., 1942
Finished Steel	$69.73	$69.73	$69.73	$69.11	$64.45	$60.91	$56.73
Semifinished Steel	52.10	52.10	52.10	49.20	40.60	39.20	36.00
Steelmaking Pig Iron	29.56	29.56	29.56	29.56	27.50	24.75	23.00
Steelmaking Scrap	33.75	33.75	32.08	31.17	22.22	19.17	19.17

Finished Steel Composite:—Average of industry-wide prices on sheets, strips, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; others, gross tons.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished material (except tin plate) and wire rods, cents per lb; coke, dollars per net ton; others, dollars per gross ton.

Finished Material

	Feb. 22, 1947	Jan., 1947	Nov., 1946	Feb., 1946
Steel bars, Pittsburgh	2.60c	2.60c	2.50c	2.375c
Steel bars, Philadelphia	2.98	2.98	2.86	2.695
Steel bars, Chicago	2.60	2.60	2.50	2.375
Shapes, Pittsburgh	2.50	2.462	2.35	2.225
Shapes, Philadelphia	2.64	2.602	2.48	2.340
Shapes, Chicago	2.50	2.462	2.35	2.225
Plates, Pittsburgh	2.65	2.612	2.50	2.375
Plates, Philadelphia	2.85	2.777	2.558	2.425
Plates, Chicago	2.65	2.612	2.50	2.375
Sheets, hot-rolled, Pittsburgh	2.50	2.50	2.425	2.3125
Sheets, cold-rolled, Pittsburgh	3.20	3.20	3.275	3.1625
Sheets, No. 10 galv., Pittsburgh	3.55	3.55	†4.05	†3.875
Sheets, hot-rolled, Gary	2.50	2.50	†2.425	†2.3125
Sheets, cold-rolled, Gary	3.20	3.20	3.275	3.165
Sheets, No. 10 galv., Gary	3.55	3.55	†4.05	†3.875
Hot-rolled strip, Pittsburgh	2.50	2.50	2.35	2.225
Cold-rolled strip, Pittsburgh	3.20	3.20	3.05	2.925
Bright basic, bess, wire, Pittsburgh	3.425	3.420	3.05	2.90
Wire nails, Pittsburgh	4.125	4.062	3.75	3.075
Tin plate, per base box, Pittsburgh	$5.75	$5.75	*$5.25	*$5.125

* Nominal. † Base changed in December to 10 gage.

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$58.00	$52.25	$38.00	$37.00
Slabs, Pittsburgh, Chicago	51.00	48.00	39.00	37.50
Rerolling billets, Pittsburgh	51.00	48.00	39.00	37.50
Wire rods ¼ to 9/32-inch, Pitts.	2.675c	2.675c	†2.30c	2.225c

† Base changed in December from 24 gage to 10 gage.

Pig Iron

	Feb. 22, 1947	Jan., 1947	Nov., 1946	Feb., 1946
Bessemer, del. Pittsburgh	$31.83	$31.815	$29.77	$26.9
Basic, Valley	30.00	30.00	28.00	25.2
Basic, eastern del. Philadelphia	32.01	31.99	29.93	27.0
No. 2 fdry., del. Pgh. N. & S. sides	31.33	31.315	29.27	28.4
No. 2 fdry., del. Philadelphia	32.51	32.49	30.43	27.5
No. 2 foundry, Chicago	30.50	30.50	28.50	25.7
Southern No. 2, Birmingham	26.88	26.88	24.88	22.1
Southern No. 2, del. Cincinnati	31.75	31.75	28.94	26.0
Malleable, Valley	30.50	30.50	28.50	25.7
Malleable, Chicago	30.50	30.50	28.50	25.7
Charcoal, low phos., fob Lyles, Tenn.	37.50	37.50	33.00	33.0
Gray forge, del. McKees Rocks, Pa.	30.66	30.65	28.61	25.8
Ferromanganese, fob cars, Pittsburgh	140.00	140.00	140.00	140.0

Scrap

Heavy melting steel, No. 1, Pittsburgh	$35.00	$32.50	$23.00	$20.0
Heavy melt. steel, No. 2, E. Pa.	33.75	31.00	21.90	18.7
Heavy melting steel, Chicago	32.50	30.00	21.75	18.7
Rails for rolling, Chicago	38.50	35.688	24.25	22.2
No. 1 cast, Chicago	42.50	41.25	29.00	20.0

Coke

Connellsville, furnace ovens	$8.875	$8.812	$8.75	$7.5
Connellsville, foundry ovens	9.875	9.812	9.50	8.2
Chicago, by-product fdry., del.	16.10	15.912	15.10	13.7

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Finished steel quoted in cents per pound and semifinished in dollars per gross ton, except as otherwise noted. Delivered prices do not include the 3 per cent federal tax on freight.

Semifinished Steel

Carbon Steel Ingots: Rerolling quality, standard analysis, price negotiated, fob mill. Forging quality, $40, Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown.

Alloy Steel Ingots: Pittsburgh, Buffalo, Bethlehem, Canton, Massillon, Coatesville, uncrop, $52.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $42; Portsmouth Steel Corp., $55-$60, Portsmouth, O. Detroit, del., $45; eastern Mich., $46.

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $50; Detroit, del., $53; eastern Mich., $54.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $61; del. Detroit $64; eastern Mich., $65.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $50; Portsmouth Steel Corp., $66 Portsmouth, O.

Skelp: Pittsburgh, Sparrows Point, Youngstown, Coatesville, lb 2.35c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, ¼ to 9/32-in., inclusive, $2.55-$2.80 per 100 lb. Galveston base, $2.65. Worcester, add $0.10. San Francisco (base, del.), $3.27.

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3-in.: Pittsburgh, Youngstown, Chicago, Gary, Cleveland, Buffalo, Birmingham base, 20 tons one size, 2.60c; Detroit, del., 2.75c; eastern Mich., 2.80c; New York, del., 3.01c; Philadelphia, del., 2.98c, San Francisco (base, del.), 3.33-3.65c; Los Angeles (base, del.), 3.325-3.56c; Seattle, 3.285c, base.

Rail Steel Bars: Price, 2.60c-2.95c, same basing points as merchant carbon bars, except base is 10 tons.

Hot-Rolled Alloy Bars: Pittsburgh, Youngstown, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 3.05c; Detroit, del., 3.20c; eastern Mich., 3.25c. (Texas Steel Co. uses Chicago base price as maximum fob Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base, 20,000-39,999 lb, 3.20c; Detroit, 3.35c; Toledo, 3.40c.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Canton, base, 3.80c; Detroit, del., 3.95c; eastern Mich., 4.00c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base, 2.45c; Detroit, del., 2.60c; eastern Mich. and Toledo, 2.65c; San Francisco (base, del.), 3.03c; Los Angeles (base, del.), 3.025c; Seattle, 2.985c, base.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Buffalo, base, 2.60c-2.95c; Detroit, del., 2.75c; eastern Mich. and Toledo, del., 2.80c.

Iron Bars: Single refined, Pitts., 6.15c; double refined, 7.00c; Pittsburgh, staybolt, 7.85c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base, 2.50c; Detroit, del., 2.65c; eastern Mich., del., 2.70c; Philadelphia, del., 2.70c; New York, del., 2.79c. (Andrews Steel Co., quotes on Middletown, O., base for shipment to Detroit area; Alan Wood Steel Co., Conshohocken, Pa., quotes 3.10c, Sparrows Point Md., base; Granite City Steel Co., 2.875c, fob Granite City, Ill., 2.775c, fob Gary or Birmingham.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.20c; Granite City, base, 3.30c; Detroit del., 3.35c; eastern Mich., del., 3.40c; New York, del., 3.61c; Philadelphia, del., 3.58c.

Galvanized Sheets, No. 10: Pittsburgh, Chicago, Gary, Birmingham, Youngstown, Sparrows Point, Canton, Middletown, base 3.55c; New York, del., 3.84c; Philadelphia, del., 3.75c.

Corrugated Galvanized Sheets, No. 10: Pittsburgh, Chicago, Gary, Birmingham, base, 3.55

Culvert Sheets, No. 16, not corrugated, copper alloy: Pittsburgh, Chicago, Gary, Birmingham 4.15c; Granite City, 4.25c; copper iron 4.50c pure iron, 4.50c.

Aluminized Sheets, No. 20 hot-dipped, coils cut to lengths: Pittsburgh, 9.00c.

Long Ternes, No. 10: Pittsburgh, Chicago Gary, base, 3.55c.

Enameling Sheets, No. 12: Pittsburgh, Chicago Gary, Cleveland, Youngstown, Middletown base, 3.55c; Granite City, base, 3.65c; Detroit del., 3.70c; eastern Mich., 3.75c.

Electrical Sheets, No. 24: Field: 4.20c, Pittsburgh, Chicago, Gary; 4.30c, Kokomo, Ind. Armature: 4.50c, Pittsburgh, Chicago, Gary 4.60c, Granite City, Ill., Kokomo, Ind. Electrical: 5.00c, Pittsburgh, Chicago, Gary; 5.10 Granite City, Kokomo. Motor: 5.75c, Pittsburgh, Chicago, Gary; 5.85c, Granite City Dynamo: 6.45c, Pittsburgh; 6.55c, Granite City Transformer 72, 6.95c; 65, 7.65c; 58, 8.35c; 9.15c, Pittsburgh.

Hot-Rolled Strip: Pittsburgh, Chicago, Gary Birmingham, Youngstown, base, 2.50c; Detroit del., 2.65c; eastern Mich., del., 2.70c. (Superior Steel Corp., 3.30c, Pittsburgh).

Cold-Rolled Strip, 0.25 carbon and less: Pittsburgh, Cleveland, Youngstown, 3.20c; Chicago base, 3.30c; Detroit, del., 3.35c; eastern Mich 3.40c; Worcester, base, 3.40c. (Superior Steel Corp., 4.70c, Pittsburgh.)

Cold-Finished Spring Steel, 0.26-0.40 carbon Pittsburgh, Cleveland, base, 3.20c; over 0.40 to 0.60 carbon, 4.70c; over 0.60 to 0.80, inc 5.30c; add 0.20c for Worcester.

in, Terne, Plate

n Plate: Pittsburgh, Chicago, Gary, Warren, 100-lb base box, $5.75; Granite City, Birngham, Sparrows Point, $5.85.

ectrolytic Tin Plate: Pittsburgh, Gary, War-n, O., 100-lb base box 0.25 lb tin, $4.85; 0.50 tin, $5.05; 0.75 lb tin, $5.25; Granite City, rmingham, Sparrows Point, $4.95, $5.15, .35, respectively.

n Mill Black Plate: Pittsburgh, Chicago, ry, Warren, O., base 29-gage and lighter, 50c; Granite City, Birmingham, Sparrows int, 3.70c.

anufacturing Ternes (Special Coated): Pitts-rgh, Chicago, Gary, 100-base box, $4.90; anite City, Birmingham, Sparrows Point, .00.

ofing Ternes: Pittsburgh base per package 2 sheets: 20 x 28 in., coating I. C. 8-lb 3.50; 15-lb $15.50.

lates

rbon Steel Plates: Pittsburgh, Chicago, Gary, eveland, Birmingham, Youngstown, Sparrows oint, 2.65c; Coatesville, Claymont, Geneva, tah, 2.80c; New York, del. 2.94c; Phila., del., 85c; St. Louis, del., 2.74c; Boston, del., 2.86c. n Francisco and Los Angeles, del., 3.46-3.52c. Central Iron & Steel Co., Harrisburg, Pa., 40c, basing points; Alan Wood Steel Co., onshohocken, Pa., 2.80c, Coatesville and Clay-ont equivalent.)

oor Plates: Pittsburgh, Chicago, 3.90c.

pen-Hearth Alloy Plates: Pittsburgh, Chicago, 787c; Coatesville, 4.15c.

ad Steel Plates: Coatesville, 10% cladding: ckel clad, 21.50c; inconel-clad, 30.00c; monel-ad, 29.00c.

hapes

ructural Shapes: Pittsburgh, Chicago, Gary, irmingham, Buffalo, Bethlehem, 2.50c; Gen-a, Utah, 2.65c; New York, del., 2.70c: Phila., l., 2.64c. San Francisco and Los Angeles, l., 3.37c-3.41c.

Phoenix Iron Co., Phoenixville, Pa., nominally, 05c, Bethlehem, Pa., equivalent.)

eel Piling: Pittsburgh, Chicago, Buffalo, $3 r 100 lb.

Wire and Wire Products

Fob Pittsburgh, Chicago, Cleveland and Birmingham per 100 pounds).

ire to Manufacturers in carloads

ight, basic or bessemer .. ....*$3.30-$3.55
ring (except Birmingham) **$4.25

ire Products to Trade

ails and Staples

andard and cement-coated.....†$3.75-$4.50
alvanized .....‡$3.75-$4.50

ire, Merchant Quality

nnealed (6 to 8 base)..... $3.95
alvanized (6 to 8 base)..... $4.40
ob Pittsburgh, Chicago, Birmingham, per se column)

oven fence, 15 gage and heavier..... ††84
rbed wire, 80-rod spool..... ††94
rbless wire, twisted..... 94
nce posts ..... ††82
le ties, single loop ..... ††86

* Add $0.10 for Worcester, $0.05 for Duluth. n Francisco (base, del.), $4.31 for bright tic only.

** Add $0.10 for Worcester, $0.25 for luth and Trenton, N. J. San Francisco se, del.), $5.63 for MB spring wire; $5.28, ck premier.

† Add $0.30 Worcester; $0.10 Cleveland. San ncisco (base del), $4 83.

†† San Francisco (base. del.), $4.83.

‡ Add $0.10 for Worcester. San Francisco se, del.), $4.96 for annealed; $5.41 galvanized.

†† San Francisco (base, del.) woven fence, ; barbed wire, 114; bale ties, 110; Duluth, ce posts, 84.

ails, Supplies

ils: Standard, over 60-lb. fob mill, $2.50 per lb. Light rails (billet), Pittsburgh, Birmingn. $2.85 per 100 lb; light rails (rail steel), 5. Williamsport, Pa.

aying, 35 lb and over, fob railroad and ing point, $43-$46 per net ton.

plices: Track bolts, 6.50c; heat treated, 6.75c. Tie plates, $2.80 per 100 lb, fob mill; $3.15 base, Seattle. Splice bars, $3 per 100 lb. Standard spikes, 3.65c-4.50c; screw spikes, 5.30-6.40c.

Tubular Goods

Standard Pipe: Base price in carlots, threaded and coupled, to consumers about $200 a net ton. Base discounts Pittsburgh on all types; Lorain on steel butt weld, and seamless; Gary, Ind., 2 points less on steel lap weld and 1 point less on steel butt weld on sizes produced in that district.

Butt Weld

	Steel			Iron	
In.	Blk.	Gal.	In.	Blk.	Gal.
⅛	48	23	⅛	— 2	+20
¼ & ⅜	51	30½	¼	—11½	+10
½	55½	41	1-1¼	—17	+ 2
¾	58½	45	1½	—22½	— 1½
1-3	60½	47½	2	—23	— 2

Lap Weld

	Steel			Iron	
In.	Blk.	Gal.	In.	Blk.	Gal.
2	53	39½	1¼	— 1	+20
2½-3	56	42½	1½	— 7	+13
3½-6	58	44½	2	—14½	+ 5½
*8	58	42½	2½-3½	—17	+ 1½
*10	57½	42	4	—21	— 4
*12	56½	41	4½-8	—19	— 2½
			9-12	—10	+ 7

* Not T. & C.

Seamless Steel

In.	Blk.	Gal.	In.	Blk.	Gal.
2	52	38½	*8	57	42
2½-3	55	41½	*10	56½	42
3½-6	57	43½	*12	55½	41

* Not T. & C.

Line Pipe: Base price in carlots to consumers about $200 a net ton. Base discounts Pittsburgh and Lorain, O.

In.	Seamless	In.	Butt Weld
2	51	⅛	47
2½ & 3	54	¼ & ⅜	50
3½ to 8	56	½	54½
10	55½	¾	57½
12	54½	1 to 3	59½

Boiler Tubes: Net base prices per 100 feet, fob Pittsburgh, in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

		——Seamless——		—Elec. Weld—	
O.D.		Hot	Cold	Hot	Cold
Sizes	B.W.G.	Rolled	Drawn	Rolled	Drawn
1"	13	....	$10.89	$10.62	$10.62
1¼"	13	....	12.90	10.59	12.58
1½"	13	$12.00	14.26	11.70	13.90
1¾"	13	13.65	16.23	13.31	15.82
2"	13	15.29	18.17	15.00	17.95
2¼"	13	17.05	20.26	16.71	20.00
2¼"	12	18.78	22.31	18.38	22.00
2½"	12	20.57	24.43	20.11	24.07
2¾"	12	21.80	25.89	21.27	25.46
3"	12	22.87	27.18	22.26	26.68
3¼"	11	26.88	31.94	26.15	31.33
3½"	11	28.86	34.30	28.06	33.64
4"	10	35.82	42.55	34.78	41.68
4½"	9	47.48	56.42	....	....
5"	9	54.96	65.30	....	....
6"	7	84.38	100.25	....	....

Pipe, Cast Iron: Class B, 6-in. and over $65 per net ton, Birmingham; $70, Burlington, N. J.; $75.56, del., Chicago; 4-in. pipe, $5 higher, Class A pipe, $3 a ton over class B.

Bolts, Nuts

Fob Pittsburgh, Cleveland, Birmingham, Chicago; add 15c per cwt, Lebanon, Pa. Additional discounts: 5 for carloads; 15 for full containers, except tire, step and plow bolts.

Carriage and Machine

½-in. and smaller; up to 6 in. in length	55 off
⅝ and ⅜, up to 6 in. in length	52 off
¾ x 6 in.	49 off
⅞ and 1 in. x 6 in. length	51 off
1⅛ in. and larger in all lengths and ⅝ in. and larger in lengths over 6 in.	48 off
⅛ in. and smaller, longer than 6 in.	45 off
Tire bolts	38½ off
Step bolts	46 off
Plow bolts	57 off

Stove Bolts

In packages, nuts separate, 60-10 off; bulk 74 off on 15,000 of 3-in. and shorter, or 5000 over 3-in., nuts separate.

Nuts

	A.S. Light	A. S. Reg. and Heavy
Semifinished hexagon	51 off	....
⅞-in. and smaller	....	48 off
½-in. and smaller	48 off	....
⅞-in.-1-in.	....	47 off
1⅛-in.-1½-in.	46 off	45 off
1⅝-in. and larger	....	44 off

Additional discount of 15 for full containers.

Hexagon Cap Screws

Upset 1-in., smaller (10-20 bright)	56 off
Upset (10-35 heat treated)	
⅝ x 6	51 off
¾, ⅞ & 1 x 6	47 off

Square Head Set Screws

Upset 1-in. and smaller	61 off
Headless, ¼-in. and larger	46 off
No. 10 and smaller	56 off

Rivets

Fob Pittsburgh, Cleveland, Chicago Birmingham, Lebanon, Pa.

Structural	5.25c
⅞-inch and under	55-5 off

Washers, Wrought

Fob Pittsburgh, Chicago, Philadelphia, to jobbers and large nut and bolt manufacturers, lcl .....$1.50-$2.00 off

Tool Steels

Tool Steel: Pittsburgh, Bethlehem, Syracuse, Canton, O., Dunkirk, N. Y., base, cents per lb; reg. carbon 15.15c; extra carbon 19.48c; special carbon 23.80c; oil-hardening 25.97c; high carbon-chromium 46.53c.

W	Cr	V	Mo	Base, per lb
18.00	4	1	...	72.49c
1.5	4	1	8.5	58.43c
....	4	2	3	58.43c
6.40	4.15	1.90	5	62.22c
5.50	4.50	4	4.50	75.74c

Stainless Steels

Grade	Bars, Drawn Wire, Structurals	Plates	Sheets	Hot Rolled Strip	Cold Rolled Strip
	Base, Cents per lb				
	CHROMIUM NICKEL STEELS				
301	26.00c	29.50c	37.00c	22.00c	28.00c
302	26.00	29.50	37.00	23.50	30.50
303	28.50	31.50	39.00	29.50	36.00
304	27.50	31.50	39.00	25.50	32.50
308	31.50	37.00	44.50	31.00	38.00
309	39.00	43.50	51.00	40.50	51.00
310	53.50	56.50	57.50	53.00	61.00
316	43.50	48.00	52.00	43.50	52.00
321	31.50	37.00	44.50	32.00	41.50
347	36.00	41.50	49.00	36.00	45.50
431	21.00	24.00	31.50	19.00	24.50
440A	26.00	31.00	36.50	26.00	30.50
	STRAIGHT CHROMIUM STEEL				
403	23.50	27.00	32.00	23.00	29.50
410	20.50	23.50	29.00	18.50	24.00
416	21.00	24.00	29.50	20.00	25.50
420	26.00	31.00	36.50	26.00	39.50
430	21.00	24.00	31.50	19.00	24.50
430F	21.50	24.50	32.00	20.50	27.00
442	24.50	28.00	35.50	26.00	35.00
443	24.50	28.00	35.50	26.00	35.00
446	30.00	33.00	39.50	38.00	56.50
*501	9.00	13.00	17.50	13.00	18.50
*502	10.00	14.50	18.50	14.50	19.50
	†STAINLESS CLAD STEEL (20%)				
304	....	24.00	22.00	....	....
410	....	22.00	20.00	....	....
430	....	22.50	20.50	....	....
446	....	29.00	27.00	....	....

* Low chromium. † Fob Pittsburgh and Washington, Pa.; plate prices include annealing and pickling.

Metallurgical Coke

	Price Per Net Ton Beehive Ovens
Connellsville, furnace	*$8.75-$9.00
Connellsville, foundry	9.75-10.00
New River, foundry	11.75
Wise county, foundry	9.00- 9.50
Wise county, furnace	8.50- 9.00

* Operators of hand-drawn ovens using trucked coal, $9.35-$9.60.

Coke By-Products

Spot, gal, freight allowed east of Omaha

Pure and 90% benzol	17.00c
Toluol, two degrees	22.00c
Industrial xylol	22.00c
Solvent naphtha	26.00c
Per pound fob works	
Phenol (car lots, returnable drums)	11.25c
Do., less than carlots	12.00c
Do., tank cars	10.25c
Eastern plants, per pound	
Naphthalene flakes, balls, bbl, to jobbers, "household use"	9.50c
Per ton, bulk, fob plants	
Sulphate of ammonia	$30.00

PIG IRON

Prices per gross ton. Minimum delivered prices do not include 3 per cent federal tax.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$31.50	$31.00	$32.50	$32.00
Newark, N. J., del.	33.34	32.84	34.34	35.54
Brooklyn, N. Y., del.	34.50	....	....	35.00
Birdsboro, Pa., base	34.50	34.00	35.50	35.00
Birmingham, base	26.88	25.50	31.50	....
Baltimore, del.	33.28	....	....	....
Chicago, del.	31.12	....	....	....
Cincinnati, del.	31.75	30.37	....	....
Newark, N. J., del.	32.96	....	....	....
Philadelphia, del.	32.13	31.63	....	....
St. Louis, del.	30.87	31.79	....	....
Buffalo, base	30.50	30.00	31.50	31.00
Boston, del.	36.98	36.48	37.98	37.48
Rochester, del.	32.34	31.84	33.34	32.84
Syracuse, del.	33.00	32.50	34.00	33.50
Canton, Massillon	30.50	30.00	....	30.50
Chicago, base	30.50	30.00	31.00	30.50
Milwaukee, del.	31.82	31.32	32.32	31.82
Muskegon, Mich., del.	34.33	....	....	34.38
Cleveland, fob furnace	30.50	30.00	31.00	30.50
Akron	32.17	31.67	32.67	32.17
Detroit, base	30.50	30.00	31.00	30.50
Saginaw, Mich., del.	33.67	33.17	34.17	33.67
Duluth, base	31.00	30.50	31.50	31.00
Erie, Pa., base	30.50	30.00	31.50	31.00
Everett, Mass., base	29.50	29.00	30.50	30.00
Boston, del.	30.00	29.50	31.00	30.50
Granite City, Ill., base	30.50	30.00	31.00	30.50
St. Louis, del.	31.25	30.75	....	31.25
Neville Island, Pa., base	30.50	30.00	31.00	30.50
†Pittsburgh, del., N.&S. sides.	31.33	30.83	31.83	31.33
Provo, Utah, base	30.50	30.00	....	....
Sharpsville, Pa., base	30.50	30.00	31.00	30.50
Steelton, Pa., base	31.50	31.00	32.50	32.00
Swedeland, Pa., base	31.50	31.00	32.50	32.00
Philadelphia, del.	32.51	32.01	....	33.01
Troy	31.50	31.00	32.50	32.00
Toledo, O., base	30.50	30.00	34.50	34.00
Cincinnati, del.	34.00	33.50	....	....
Youngstown, O., base	30.50	30.00	31.00	30.50
Mansfield, O., del.	33.48	32.98	33.98	33.48

† To Neville Island base add: 66c for McKees Rocks, Pa.; $1.01 Lawrenceville, Homestead, McKeesport, Ambridge, Monaco, Aliquippa; 97c (water), Monongahela; $1.33, Ookmont, Verona; $1.49 Brackenridge.

Exceptions to above prices: Kaiser-Frazer Parts Corp., Struthers, O., charges 50 cents a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable pig iron.

High Silicon Silvery

6.00-6.50 per cent (base).....$38.00

6.51-7.00	$39.00	9.01- 9.50	44.00
7.01-7.50	40.00	9.51-10.00	45.00
7.51-8.00	41.00	10.01-10.50	46.00
8.01-8.50	42.00	10.51-11.00	47.00
8.51-9.00	43.00	11.01-11.50	48.00

Fob Jackson, O., per gross ton, Buffalo base $1.25 higher. Buyer may use whichever base is more favorable.

Electric Furnace Ferrosilicon: Si 14.01-14.50%, $52.75, Jackson, O.; $56 Keokuk, Iowa; $54, Buffalo and Niagara Falls, N. Y. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.5% Mn over 1%; $1 a ton for 0.045% max. phos.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Semi-cold blast, low phosphorus. Fob furnace, Lyles, Tenn.... $37.50 (For higher silicon irons a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Gray Forge

Neville Island, Pa. $30.00

Low Phosphorus

Steelton, Pa., Buffalo, Troy, N. Y., $36, base; Birdsboro, Pa., $39, base; Philadelphia, $38.16, del. Intermediate phosphorus, Central furnace, Cleveland, $33.

Differentials

Basing point prices are subject to following differentials:

Silicon: An additional charge not to exceed 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

Phosphorus: A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

Manganese: An additional charge not to exceed 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

Nickel: An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

Refractories

Per 1000, fob shipping point Net Prices

Fire Clay Brick

Super Duty

Pa., Mo., Ky. $8

High Heat Duty

Pa., Ill., Md., Mo., Ky. 6
Ala., Ga. 6
N. J. 7

Intermediate Heat Duty

Ohio 5
Pa., Ill., Md., Mo., Ky. 5
Ala., Ga. 5
N. J. 6

Low Heat Duty

Pa., Md., Ohio..... 5

Malleable Bung Brick

All bases 7

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry Press 4
Wire Cut 4

Silica Brick

Pennsylvania 6
Joliet, E. Chicago..... 7
Birmingham, Ala. 6

Magnesite

Domestic dead-burned grains, ton, fob Chewelah, Wash.
Bulk 2
Bags 2

Basic Brick

Net ton, fob Baltimore, Plymo Meeting, Chester, Pa.

Chrome brick 5
Chem. bonded chrome..... 5
Magnesite brick 7
Chem. bonded magnesite..... 9

ORES

Lake Superior Iron Ore

Gross ton, 51½% (Natural) Lower Lake Ports

Old range bessemer $5.95
Old range nonbessemer..... 5.80
Mesabi bessemer 5.70
Mesabi nonbessemer 5.55
High phosphorus 5.55

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract 14.00

Foreign Ore

Cents per unit, c/f Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mn.... Nom.
N. African low phos..... Nom.
Swedish basic, 60 to 68% 13.00
Spanish, No. African basic, 50 to 60%..... Nom.
Brazil iron ore, 68-69% fob Rio de Janeiro..... 7.50–8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid $24.00

Chrome Ore

Gross ton fob cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Oreg., or Tacoma, Wash. (S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African

48% 2.8:1 ..... $37.50
48% 3:1 ..... 39.00
48% no ratio..... 31.00

South African (Transvaal)

44% no ratio .....$27-$27.50
45% no ratio..... 28.00
48% no ratio..... 30.00
50% no ratio..... 31.00

Brazilian—nominal

44% 2.5:1 lump..... $33.65
48% 3:1 lump 43.50

Rhodesian

45% no ratio.....$27-$27.50
48% no ratio..... 30.00
48% 3:1 lump..... 39.00

Domestic (seller's nearest rail)

48% 3:1 ..... $39.00

Manganese Ore

Sales prices of Office of Metals Reserve, cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85c; Fontana, Calif., Provo, Utah, and Pueblo, Colo., 91c; prices include duty on imported ore and are subject to established premiums, penalties and other provisions. Price at basing points which are also points of discharge of imported m ganese ore is fob cars, shipside dock most favorable to the bu Outside shipments direct to sumers at 15c per unit less Metals Reserve prices.

Molybdenum

Sulphide conc., lb., Mo. cont., mines .....

Fluorspar

Metallurgical grade, fob ship point in Ill., Ky., net tons, carlo effective CaF_2 content, 70% or m $33; 65% to 70%, $32; 60% to 6 $31; less than 60%, $30.

HIGH-STRENGTH—LOW-ALLOY STEELS

Prices in dollars per 100 pounds.

	Pittsburgh	Chicago	Gary	Youngstown	Sparrows Point	Buffalo	Bethlehem	Canton	Mass
Sheets, Hot-Rolled....	3.75–3.85	3.75–3.85	3.75–3.85	3.85	3.85	3.75–3.85	...	...	...
Cold-Rolled	4.55–4.75	4.55–4.75	4.55–4.75	4.75	...	4.55–4.75	...	...	...
Galvanized	5.40	.....	.....	...	...	.....	...	...	...
Strip, Hot-Rolled	3.75–3.85	3.75–3.85	3.75–3.85	3.85	...	.....	...	...	...
Cold-Rolled	4.55	4.65	4.65	4.65	...	.....	...	...	...
Shapes, Structural	3.85	3.85	.....	3.85	...	.....	3.85	...	...
Plates	4.10	4.10	4.10	...	4.10	.....	...	...	...
Bars and Bar Shapes..	4.00	4.00	4.00	4.00	...	4.00	4.00	4.00	4.0

Note: Lower level of quoted ranges represent prices for NAX High Tensile, produced by Great Lakes Steel (Detroit.

WAREHOUSE STEEL PRICES

Base prices, cents per pound, for delivery within switching limits, subject to extras

	SHEETS					STRIP		BARS				PLATES	
	H-R 10G	C-R 10G	C-R 17G	Gal. °10G	Gal. °24G	†H-R	C-R	H-R	C-F	H-R Alloy ($4140)	Structural Shapes	Carbon ¼"-¾"	Floor ¾" & Thicker
Boston (city)	4.50	....	5.22[1]	6.80[4]	6.80[4]	4.65	6.36	4.62	5.47	7.12	4.47	4.80	6.42
New York (city)	4.42	....	5.27[8]	5.47[8]	....	4.62	....	4.62	5.42	8.42[12]	4.37	4.72	6.35
New York (country)	4.32	....	5.17[8]	5.37[8]	....	4.52	....	4.52	....	....	4.27	....	6.25
Philadelphia (city)	4.24	5.73[9]	5.33[9]	5.29[5]	6.54[5]	4.43	5.28	4.48	5.38	6.87	4.22	4.40	5.93
Philadelphia (country)	4.14	5.63[9]	5.23[9]	5.19[5]	6.44[5]	4.33	5.18	4.38	....	6.60	4.12	4.30	5.83
Baltimore (city)	4.09	6.15[8]	5.65[8]	5.14[5]	6.39[5]	4.40	....	4.45	5.35	....	4.34	4.39	5.90
Baltimore (country)	3.59	6.05[8]	5.55[9]	....	....	....	....	....	4.85	....	4.24	4.29	5.80
Washington (city)	4.35	....	....	5.18[5]	6.43[5]	4.65	....	4.70	5.60[11]	....	4.60	4.65	6.60
Norfolk, Va.	4.35	....	....	....	....	....	....	4.75	5.50	....	4.50	4.50	6.25
Buffalo (city)	4.00	....	4.70[6]	4.35[5]	....	4.30	4.95	4.05	4.95	....	4.05	4.60	5.90
Buffalo (country)	3.90	....	4.60[6]	4.95[5]	....	3.90	4.60	3.95	4.85	6.60	3.95	4.20	5.45
Pittsburgh (city)	4.00	5.15[8]	4.70[8]	5.05[5]	6.30[5]	4.00	4.95	4.05	4.95	6.60	4.05	4.30	5.55
Pittsburgh (country)	3.90	5.05[8]	4.60[8]	4.95[5]	6.20[5]	3.90	4.85	3.95	4.85	6.60	3.95	4.20	5.45
Youngstown, O. (city)	4.188	5.338	4.888	5.05	6.30	4.00	....	4.238	5.138	....	4.218	4.488	5.178
Youngstown, O. (country)	....	....	....	4.95	6.20	3.90	....	....	....	....	....	....	....
Cleveland (city)	4.00	5.15[8]	4.70[8]	5.238[5]	6.488[5]	4.00	5.05	4.05	4.95	6.858	4.311	4.30	5.811
Cleveland (country)	3.90	5.05[8]	4.60[8]	....	....	3.90	4.95	3.95	4.85	....	....	4.20	....
Cincinnati	4.116	5.266[8]	....	5.166[5]	....	4.394	....	4.403	5.303	....	4.444	4.653	5.944
Chicago (city)	4.00	5.15[8]	4.70[8]	5.05[5]	6.30[5]	4.00	5.05	4.05	4.95	6.60	4.05	4.30	5.70
Chicago (country)	3.90	5.05[8]	4.60[8]	4.95[5]	6.20[5]	3.90	4.95	3.95	4.85	6.60	3.95	4.20	5.60
Milwaukee	4.199	5.349[8]	4.899[8]	5.249[5]	6.499[5]	4.199	5.249	4.249	5.149	6.899	4.249	4.499	5.899
St. Paul	4.384[1]	5.534[8]	5.084[8]	5.434[5]	6.684[5]	4.404[13]	....	4.434[13]	5.726[11]	7.084[11]	4.434[13]	4.684[13]	6.084[13]
Indianapolis	4.04	....	4.84[8]	5.29[5]	6.54[5]	4.24	....	4.36‡‡	5.26	....	4.36	4.61	6.01
St. Louis	4.199	....	4.899[8]	....	6.674[5]	4.199	....	4.249	5.324[18]	7.074	3.999	3.999	5.999
Birmingham (city)	3.85[20]	....	....	5.20[5]	....	4.10[20]	....	4.05[20]	5.83	....	4.05	4.30	6.56
Birmingham (country)	3.75[20]	....	....	5.20[5]	....	4.00[20]	....	3.95[20]	....	....	3.95	4.20	....
New Orleans	4.46°°	....	5.77[8]	....	....	4.83[20]	....	4.78°°	6.14[11]	....	4.68°°	4.83[20]	6.94[20]
Houston, Tex.	4.50[1]	....	....	....	6.00[13]	....	....	4.75[1]	....	....	....	....	....
Oklahoma, Nebr.	4.868	6.118[8]	....	5.918[5]	7.168[5]	4.862	....	4.918	5.818[11]	....	4.918	5.168	6.568
Omaha, Nebr.	4.868	6.118[8]	....	5.918[5]	7.168[5]	4.862	....	4.918	5.818[11]	....	4.918	5.168	6.568
Los Angeles	5.55	....	7.10[8]	....	8.10[5]	5.65	8.35	5.10	6.90[19]	7.85	5.20	5.20	7.20
San Francisco	4.90§§	....	6.30[5]	....	7.35[5]	5.20[14]	8.35	4.75[14]	°°°	9.35[16]	4.90[14]	5.00[14]	6.80[14]
Tacoma, Wash.	....	....	....	7.30[5]	....	5.20[17]	....	4.90[17]	6.75[19]	8.95[19]	4.95[17]	5.25[17]	7.25[17]
Seattle	....	....	....	7.30[5]	....	5.20[17]	....	4.90[17]	6.75[19]	8.95[19]	4.95[17]	5.25[17]	7.25[17]

Base Quantities: 400 to 1999 pounds except as noted: Cold-rolled strip, 2000 to 39,999 pounds; cold finished bars, 1000 pounds and over; [1]—any antity; [2]—300 to 1999 pounds; [3]—150 to 2249 pounds; [4]—three to 24 bundles; [6]—450 to 1499 pounds; [7]—one bundle to 1499 pounds; [7]—one to e bundles; [8]—400 to 1499 pounds; [9]—1000 to 1999 pounds; [10]—450 to 89,999 pounds; [11]—1000 to 39,999 pounds; [12]—1000 pounds and over. -400 to14,999 pounds; [14]—400 to 39,999; [15]—2000 lb and over; [16]—1000 to 49,999; [17]—300 to 9999 pounds; [18]—1500 to 1999 pounds; [19]—1500 to ,999; [20]—400 to 3999 pounds.

° Includes gage and coating extra, except Birmingham (coating extra excluded); † does not include gage extras; ‡ basing point cities with quotations resenting mill prices plus warehouse spread; § as rolled. except New York, Jersey City, Indianapolis and San Francisco where price represents ealed bars; °° add 0.46 for sizes not rolled in Birmingham; †† same prices quoted for Jersey City, N. J.; ‡‡ add 15c for 100 lb for slow mov- items; §§ 18 gage and heavier; °°° rounds under ⅜ in. 7.00c, ⅜ in. and over 6.50c, squares, hexagons and flats 6 in. and narrower 7.50c, flats over n. 8.25c.

Open Market Prices of Leading Ferroalloy Products

ieigeleisen: 19-21% carlot per oss ton, Palmerton, Pa., $40; ttsburgh, $44.

rromanganese, standard: 78-82% gross ton, duty paid, $135 fob rs, Baltimore, Philadelphia or w York, whichever is most favor- le to buyer, Birmingham, Ala. here Sloss-Sheffield Steel & Iron . is producer); $140.25 fob cars, ttsburgh, including 75c switching arge, (where Carnegie - Illinois eel Corp. is producer); add $8 for cked c.l., $10 for ton, $13.50 for s ton; $1.70 for each 1%, or action contained manganese over % or under 78%.

rromanganese, low carbon: East- n zone: Special, 21c; regular, 50c; medium, 14.50c; central n e: special, 21.30c; regular, 80c; medium, 14.80c; western ne: Special, 21.70c; regular, 20c; medium, 15.20c. Prices are pound contained Mn, bulk carlot pments, fob shipping point, ight allowed. Special low-carbon s content of 90% Mn, 0.10% C, d 0.06% P.

rromanganese Briquets: (Weight prox. 3 lb and containing exactly lb Mn) Prices per lb of briquets: ntract, carlots, bulk 6.40c, packed 0c, tons 7.30c, less 7.70c, eastern, ight allowed; 6.65c, 7.15c, 7.90c d 8.30c, central; 7.20c, 7.70c, 0c and 10.20c, western; spot up 5c; notched up 0.25c.

rrotungsten: Spot, 10,000 lb or re, per lb contained W, $1.90-$2; ntract, $1.88; freight allowed as west as St. Louis.

rrotitanium: 40-45%, R.R. freight owed, per lb contained Ti; ton d $1.23; less-ton lots $1.25; east- Spot up 5c per lb.

rrotitanium: 20-25%, 0.10 maxi- m C; per lb contained Ti; ton lots $1.35; less-ton lots $1.40 eastern. Spot up 5c per lb.

Ferrotitanium, High-Carbon: 15-20% contract basis, per net ton, fob Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis, 6.8% C $142.50; 3-5% C $157.50.

Ferrovanadium: V .35-55%, contract basis, per lb contained V, fob producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Ferromolybdenum: 55-75% per lb, contained Mo, fob Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% P content with unitage of $3 for each 1% of P above or below the base; gross tons per carload fob sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Contract, lump, packed; eastern zone quotations: 90-95% c.l. 12.95c, ton lots 13.45c, smaller lots 13.95c; 80-90%, c.l. 11.35c, ton lots 11.90c, smaller lots 12.45c; 75%, c.l. 10.15c, ton lots 10.75c, smaller lots 11.35c; 50% c.l. 8.45c, ton lots 9.10c, smaller lots 9.75c. Deduct 1.0c for bulk carlots 75%, 80-90%, 90-95%. Prices are fob shipping point, freight allowed, per lb of contained Si. Spot prices 0.25c higher on 80-90%, 0.30c on 75%, 0.45c on 50%.

Ferroboron: (B 17.50% max. and C 1.50% max., Al 0.50% max. and C 0.50% max.) Prices per lb of alloy, contract, ton lots $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Ferrocolumbium: 50-60%, per lb contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.50; less ton lots $2.55. Spot up 10c.

Ferrochrome: Contract, lump, packed; **high carbon,** eastern zone, c.l. 16.20c, ton lots 16.80c; central zone, add 0.40c and 1.30c; western zone, add 0.55c and 2.10c. Deduct 0.60c for bulk carlots.

High carbon, high nitrogen, add 5c to all high carbon ferrochrome prices. Deduct 0.55c for bulk carlots. Spot prices up 0.25c.

Low carbon, eastern zone, bulk, c.l., max. 0.06% C 23c; 0.1% 22.50c, 0.15% 22c, 0.2% 21.50c, 0.5% 21c, 1% 20.50c, 2% 19.50c; add 1c for 2000 lb to c.l.; central zone, add 0.4c for bulk, c.l., and 0.65c for 2000 lb to c.l.; western zone, add 0.5c for bulk, c.l., and 1.85c for 2000 lb to c.l.; carload packed differential 0.45c. Prices are per pound of contained Cr, fob shipping points.

Low carbon, high nitrogen: Add 2c to low carbon ferrochrome prices. For higher nitrogen low carbon, add 2c for each 0.25% of nitrogen over 0.75%.

Ferrochrome, Special Foundry: (Cr 62-66%, C above 5-7%.) Contract, 2-inch x D, packed, eastern zone, freight allowed, c.l. 17.05c, ton lots 17.60c, less than ton 18.30c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.60c for bulk carlots.

S. M. Ferrochrome, high carbon: (Cr 60-65%, Si, Mn and C 4-6% each.) Contract, lump, packed, eastern zone, freight allowed, c.l. 17.30c, ton lots 17.90c, less than ton 18.60c; central zone, add 0.40c for c.l. and 1.30c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Prices are per pound of contained chromium, spot prices 0.25c higher. Deduct 0.60c for bulk carlots.

S. M. Ferrochrome, low carbon: (Cr 62-66%, Si 4-6%, Mn 4-6% and C 1.25% max.) Contract, carlot, bulk 20.00c, packed 20.15c; ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained Cr; 20.40c, 20.50c, 20.95c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up 0.25c.

Ferrochrome Briquets: Containing exactly 2 lb Cr, packed eastern zone, c.l. 10.35c, ton lots 10.75c, less than ton 11.15c; central zone, add 0.25c for c.l. and 0.90c for smaller lots; western zone, add 0.55c for c.l. and 2.10c for smaller lots. Deduct 0.50c for bulk carlots. Prices per pound of briquets; spot prices 0.25c higher; notched, 0.25c higher.

Chromium Metal: 97% min. Cr, max. 0.50% C, eastern zone, per lb contained Cr bulk, c.l. 79.50c, 2000 lb to c.l. 80c; central 81c and 82.60c; western 82.25c and 84.75c, fob shipping point, freight allowed.

Chromium-Copper: (Cr 8-11%, Cu 88-90%, Fe 1% max., Si 0.50% max.) Contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Calcium metal; cast: Contract, ton lot or more, $1.60; 100 to 1999 lb, $1.95; less than 100 lb, $3.15 per lb of metal, eastern zone; $1.615, $1.965 and $3.185, western; spot up 5c.

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%), per lb of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c, and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up 0.25c.

Calcium - Silicon: (Ca 30-35%, Si

60-65% and Fe 3.00% max.), per lb of alloy. Contract, carlot, lump 13.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up 0.25c.

Silicon Metal: Min. 97% Si and max. 1% Fe, eastern zone, bulk, c.l. 13.65c; 2000 lb to c.l., 15.05c; central zone, 14.25c and 17.30c; western; 14.85c and 19.05c; min. 96% Si and max. 2% Fe, eastern, bulk, c.l. 13.15c, 2000 lb to c.l. 14.65c; central, 13.85c and 16.90c; western, 14.45c and 18.65c, fob shipping point, freight allowed. Price per lb contained Si.

Silicomanganese, containing exactly 2 lb Mn and about ⅛ lb Si eastern zone, bulk, c.l. 6.15c, ton lots 7.05c; central zone, add 0.25c for c.l. and 0.60c for ton lots; western, add 0.80c for c.l. and 2.50c for ton lots. Notched, up 0.25c.

Ferrosilicon: Weighing about 5 lb and containing exactly 2 lb Si, packed, eastern zone, c.l. 4.20c, ton lots 4.60c, less than ton lots 5c; weighing about 2½ lb and containing 1 lb Si, packed, eastern zone, c.l. 4.35c, ton lots 4.75c, less 5.15c; notched 0.25c higher; central zone, add 0.25c for c.l. and 0.60c for smaller lots; western zone, add 0.45c for c.l. and 0.90c for smaller lots. Prices are fob shipping point, freight allowed; spot prices 0.25c higher. Deduct 0.50c for bulk carlots.

Manganese Metal: (Min. 96% Mn, max. 2% Fe), per lb of metal, eastern zone, bulk, c.l. 30c, 2000 lb to c.l., 32.00c; central 31.00c and 33.45c; western, 31.45c and 34.40c.

Electrolytic Manganese: 99.9% plus, fob Knoxville, Tenn., freight allowed east of Mississippi on 250 lb or more: Carlots 32c, ton lots 34c, drum lots 36c, less than drum lot 38c. Add 1½c for hydrogen-removed metal.

Manganese-Boron: (Mn 75% approx., B 15-20%, Fe 5% max., Si 1.50% max. and C 3% max.) Prices per lb of alloy. Contract, ton lots $1.89, less $2.01, eastern, freight allowed; $1.903 and $2.023, central; $1.935 and $2.055, western; spot up 5c.

Nickel-Boron: (B 15-18%, Al 1% max., Si 1.50% max., C 0.50% max., Fe 3% max., Ni, balance). Prices per lb of alloy, Contract, 5 tons or more $1.90, 1 ton to 8 tons $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Borosil: 3 to 4% B, 40 to 45% Si; $6.25 per lb contained B, fob Philo, O., freight not exceeding St. Louis rate allowed.

Bortam: B 1.5-1.9%, ton lots, 45c per lb; less-ton lots, 50c per lb.

Carbortam: B 0.90 to 1.15% net ton to carload, 8c per lb, fob Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 5-7%, Zr 5-7%, Ti 9-11% and B 0.55-0.75%) Prices per lb of alloy, contract, or spot carlots 35.00c, ton lots 37.00c, less 39.00c, eastern, freight allowed; 35.30c, 38.10c and 40.10c, central; 35.30c, 40.05c and 42.05c, western; spot up 0.25c.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7% and Fe approx. 20%) Prices per lb of alloy, contract, carlots 12.50c, ton lots 13.25c, less 14.00c, eastern zone, freight allowed; 12.80c, 14.35c and 15.10c, central; 12.80c, 16.30c and 17.05c, western; spot up 0.25c.

CMSZ Alloy 4: (Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75% and C 3.00-4.50%). Contract or spot, carlots, bulk 12.00c, packed 12.75c; ton lots 13.50c, less 14.25c, eastern zone, freight allowed; 12.30c, 13.05c, 14.60c, 15.35c, central; 12.30c, 13.05c, 16.65c, 17.30c, western.

CMSZ Alloy 5: (Cr 50-56%, Mn 4-6%, Si 13.50-16.00%, Zr 0.75-1.25%, C 3.50-5.00%) Prices per lb of alloy, contract or spot, carlots, bulk 11.75c, packed 12.50c, ton lots 13.25c, less 14.00c, eastern, freight allowed; 12.05c, 12.80c, 16.3 17.05c, western.

Zirconium Alloy: 12-15%, per of alloy, eastern, contract, carlo bulk 4.85c, packed 5.30c, ton l 5.65c, less 6.00c; spot up 0.25c.

Zirconium Alloy: Zr 35-40%, easte contract basis, carloads in bulk package, per lb of alloy 14.50c, lots 15.75c, less 17.00c; spot 0.25c.

Alsifer: (Approx. 20% Al, 40% 40% Fe) Contract basis fob Niag Falls, N. Y., lump per lb 6.25c; lots 6.75c; less 7.25c. Spot up

Simanal: (Approx. 20% each Si, Al) Packed, lump, carload 9c, lots 9.25c, less-ton lots 9.75c per alloy; freight not exceeding Louis rate allowed.

Tungsten Metal Powder: Spot, less than 98.8%, $2.60-$2.65, fre allowed as far west as St. Louis

Grainal: Vanadium Grainal No 87.5c; No. 6, 60c; No. 79, 45c; fob Bridgeville, Pa., usual fre allowance.

Vanadium Pentoxide, technic grade: Fused, approx. 89-92% V and 5.84% NA_2O; or air dried, 85% V_2O_5 and 5.15% NA_2O, $ per lb contained V_2O_5 fob p freight allowed on quantities of lb and over to St. Louis.

Nonferrous Metal Resources To Be Surveye

Krug outlines program to counteract over-depletion during war years of copper, lead and zinc reserves . . . Cites rising costs

NEW YORK—An extensive long range mineral survey which may take 20 years to complete and cost up to $1 million was proposed by Julius A. Krug, Secretary of the Interior, in his annual report for 1946. This would constitute the first step in a program designed to assure some continued national basis for our mineral and metal economy and probably would result in discovery of important new sources of minerals.

Secretary Krug cited the huge drain on metals during the war and said it has become a mystery to most students of the problem "how we can go on being the greatest metal-using nation of the world when our reserves of copper, lead and zinc are all seriously over-depleted and rising in cost." Other steps in the program include "adding values to our low-grade minerals by finding an entirely new use for them" and continued subsidy payments to high-cost mineral producers and stockpiling minerals for possible emergency needs.

COPPER—Speedy congressional action suspending or eliminating its 4-cent duty on purchases of copper abroad is needed to prevent copper prices from rising considerably, according to large consumers of copper. Domestic production lags far behind current demand while imports have practically ended because consumers here are not willing to pay the going level in the world market plus the four-cent duty. The government ended its program of foreign copper purchases last December.

The price of copper produced outside the United States is 20.50c to 21.00c a pound, New York, exclusive of the duty, making the cost of foreign copper here 24.50c to 25.00c a pound.

Domestic copper producers are strongly opposed to permanent elimination of the four-cent duty, but some mining executives are in favor of a temporary suspension of the duty for 12 to 18 months.

LEAD—Foreign lead sold last week up to 12.00c, fas Gulf ports, which would bring the New York equivalent to about 13.50c after adding about 0.40 cents freight and 1.06 cents duty. The domestic market held steady at 13.00c, New York, and 12.80c to 12.85c, East St. Louis. Active interest is being shown in foreign metal since domestic producers can satisfy only a portion of current demand.

ZINC—A somewhat easier price tone developed in the export zinc market last week with bulk of business being done on the basis of 11.12½c, fas Gulf ports. Chief interest in the domestic market still centers around the efforts of producers to make an equitable distribution of limited special high grade supplies. Prices held firm on the basis of 10.50c, East St. Louis, for prime western.

TIN—Continuation beyond Mar. 31 of temporary controls over eight groups of items, including tin, was recommended by President Truman in a recent message to Congress. Tin ore and metal have been purchased by the government since 1940 for controlled consumption at a current annual rate of about 60,000 to 65,000 tons of pig tin a year. At the beginning of this year, government stocks available for industrial consumption had dwindled to only about 22,000 tons while uncontrolled consumption would require about 90,000 tons in 1947.

Tin conservation order, M-43, has been amended to eliminate all quota restrictions and permit some relaxation in the use of the metal during the first quarter of 1947. Important changes include: Permission to use tin plate of specified weights for domestic kitchen equipment and also permission to use 0.25 pound tin plate for the types of crowns and closures which were formerly restricted to black plate; pure tin pipe is r regarded as pig tin and may be used the manufacture of food and bever dispensing units, including soda fo tains; tin oxide may now be used in production of earthenware plumbing tures; tin may now be used to p snap fasteners, hooks and eyes; the centage of tin permitted for use in sol is increased; the 6000-pound small-o exemption from the CPA tin alloca program has been reduced to 4 pounds.

Pig tin will continue to be alloca by CPA during the first quarter of 19 totaling 18,500 tons, or a slight incr over the fourth quarter 1946 allocati

CADMIUM—Price of cadmium advanced 25 cents a pound by two ducers recently. The market is quoted $1.55 to $1.75 for sticks and in one to five tons, delivered, and $ to $1.80 for anodes and patented sha

ALUMINUM—Leading smelters o melt aluminum have reduced price to ¾-cent a pound on all grades. reduction was attributed to the l supply of scrap now available, s demand continues active. Smelters booked solidly through the first qua Piston alloy is now quoted 16.25c 16.50c; No. 12 aluminum, No. 2 gr 15.50c to 15.75½c. Steel deoxidi grades are quoted 17.00c for grad 16.00c, grade 2; 15.25c, grade 3; 14.75c, grade 4. The decline in p represents the first reduction since general price decontrol last Novembe

ANTIMONY—Antimony requiren this year, including anticipated us flame-proofing, are expected to be a 45,000 tons. Although about 35 per of this amount can be recovered scrap in this country, total supplies be inadequate to meet this demand cause the largest prewar source of ply, China, is still virtually cut off. Th fore, President Truman recommende a recent message to Congress that porary controls be continued be Mar. 31.

NONFERROUS METAL PRICES

opper: Electrolytic, carlots 19.50c-20.50c, del. onn.; Lake, 19.62½c, del. Conn. Dealers may dd ¼c for 5000 lb to carload; 1c, 1000-4999 lb; ½c, 500-999 lb; 2c, 0-499 lb. Casting, 19.25c, efinery, 20,000 lb or more; 19.50c, less than 0,000 lb.

rass Ingot: 85-5-5-5 (No. 115) 20.50c; 88-10-2 No. 215) 24.75c; 80-10-10 (No. 305) 23.50c; o. 1 yellow (No. 405) 16.25c; carlot prices, ncluding 25c per 100 lb freight allowance; add c for less than 20 tons.

inc: Price western 10.50c, brass special 10.75c, ntermediate 11.00c, E. St. Louis; high grade 1.50c, del., carlots. For 20,000 lb to carlots dd 0.15c; 10,000-20,000 lb 0.25c; 2000-10,000 0.4c; under 2000 lb 0.50c.

ead: Common 12.80-12.85c, chemical 12.90c, orroding 12.90c, E. St. Louis for carlots.

rimary Aluminum: 99% plus, ingots 15.00c el., pigs 14.00c del.; metallurgical 94% min. 3.50c del. Base 10,000 lb and over; add ½c 000-9999 lb; 1c less through 2000 lb.

econdary Aluminum: Piston alloy (No. 122 ype) 16.37½c; No. 12 foundry alloy (No. 2 rade) 15.62½c; steel deoxidizing grades, notch ars, granulated or shot: Grade 1 (95-97½%) 7.00c; grade 2 (92-95%) 16.00c; grade 3 90-92%) 15.25c; grade 4 (85-90%) 14.75c. bove prices for 30,000 lb or more; add ¼c 0,000-30,000 lb; ½c 5000-10,000 lb; ¾c 1000-000 lb; 1¼c less than 1000 lb. Prices include reight at carload rate up to 75c per 100 lb.

Magnesium: Commercially pure (99.8%) standrd ingots (4-notch, 17 lb) 20.50c per lb, carots; 22.50c 100 lb to c.l. Extruded 12-in. sticks 4.00c-38.00c.

Tin: Prices ex-dock, New York in 5-ton lots. dd 1 cent for 2240-11,199 lb, 1½c 1000-2239, ½c 500-999, 3c under 500. Grade A, 99.8% r higher (includes Straights), 70.00c; Grade 8, 99.8% or higher, not meeting specifications or Grade A, with 0.05% max. arsenic, 9.87½¢; Grade C, 99.65-99.79% incl. 69.62½c; Grade D, 99.50-99.64% incl., 69.50c; Grade E, 99.99-99.49% incl. 69.12½c. Grade F, below 99% (for tin content), 69.00c.

Antimony: American bulk carlots fob Laredo, Tex., 99.0% to 99.8% and 99.8% and over but ot meeting specifications below, 28.25c; 99.8% nd over (arsenic, 0.05% max.; other impurities, 0.1% max.) 28.75c. On producers' sales dd ¼c for less than carload to 10,000 lb; ½c for 9999-224 lb; and 2c for 223 lb and less; n sales by dealers, distributors and jobbers dd ½c, 1c, and 3c, respectively.

Nickel: Electrolytic cathodes, 99.9%, base sizes t refinery, unpacked 35c lb; 25 lb pigs produced rom electrolytic cathodes 36.50c lb; shot produced from electrolytic cathodes 37.50c lb; "F" nickel shots or ingots for additions to cast ron 35.50c lb. Prices include import duty.

Mercury: Open market, spot, New York, $87-90 per 76-lb flask.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be, $14.75 per lb contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks, and all other "regular" straight or flat forms $1.50-$1.75 lb, del.; anodes, balls, discs and all other special or patented shapes, $1.55-$1.80.

Cobalt: 97-98%, $1.50 lb for 550 lb (keg); $1.52 lb for 100 lb (case); $1.57 lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Iridium: $110 per troy ounce.

Palladium: $24 per troy ounce.

Platinum: $58-$61 per ounce.

Silver: Open market, N. Y. 70.75c per ounce.

Rolled, Drawn, Extruded Products

(Copper and brass products prices based on 19.50c, Conn., for copper. Freight prepaid on 100 lb or more.)

Sheet: Copper 30.93c; Yellow brass 27.53c; commercial bronze, 95% 31.07c, 90% 30.56c; red brass, 85% 29.53c, 80% 29.02c; best quality 28.44c; Everdur, Duronze, Herculoy or equiv., cold-drawn, 35.79c; nickel silver, 18%, 39.82c; phosphor bronze, grade A, 5%, 48.82c.

Rods: Copper, hot rolled 27.28c, cold drawn 28.28c; yellow brass, free cutting, 22.28c, not free cutting 27.22c; commercial bronze, 95% 30.76c, 90% 30.25c; red brass, 85% 29.22c, 80% 28.71c; best quality 28.13c.

Seamless Tubing: Copper 30.97c; yellow brass 30.29c; commercial bronze 90% 32.97c; red brass 85% 32.19c, 80% 31.68c; best quality brass 30.85c.

Copper Wire: Bare, soft, fob eastern mills, carlots 25.52c, less carlots 26.02c; weatherproof, fob eastern mills carlot 26.42c, less carlots 26.92c; magnet, delivered, carlots 28.93c, 15,000 lb or more 29.18c, less carlots 29.68c.

Aluminum Sheets and Circles: 2s and 3s flat mill finish, base 30,000 lb or more del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	9"-24"	25.60c	29.20c

Lead Products: Prices to jobbers: Full sheets 16.25c, 140 sq ft rolls; add per hundredweight, 25c, 80 to 140 sq ft; 50c, 20 to 80 sq ft; 75c, 10 to 20 sq ft.
Pipe: Full coils 15.50c; cut coils 15.75c.
Lead Traps and Bends: List plus 38%.

Zinc Products: Sheet, 15.50c, fob mill, 36,000 lb and over. Ribbon zinc in coils, 14.50c, fob mill, 36,000 lb and over. Plates, not over 12-in., 13.25-13.50c; over 12-in., 14.25-14.50c.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads, 20.00c; 5 tons and over, 25.00c; 1 to 5 tons, 21.00c; less than 1 ton, 21.50c.

Copper Anodes: In 500-lb lots, fob shipping point, freight allowed, cast oval, over 15 in., 36.87½c; flat untrimmed, 36.87½c; electro-deposited, 30.62½c.

Copper Carbonate: 52-54% metallic Cu, 250 lb barrels, nom.

Copper Cyanide: 70-71% Cu, 100-lb kegs or bbls, 41.50c fob Niagara Falls.

Sodium Cyanide: 96-98%, ½-oz balls, in 100 or 200 lb drums, 1 to 400 lb, 16.00c, 500 lb and over, 15.00c, fob Cleveland; 1 cent less, fob Niagara Falls.

Nickel Anodes: Cast and rolled carbonized, carloads, 48.00c; 10,000 to 30,000 lb, 49.00c; 30,000 to 10,000 lb, 50.00c; 500 to 3000 lb, 51.00c; 100 to 500 lb, 53.00c; under 100 lb, 56.00c; add 1 cent for rolled depolarized.

Nickel Chloride: 100-lb kegs, 22.00c; 275-lb bbls, 22.00c.

Tin Anodes: Bar, 1000 lb and over 82.50c; 500 to 1000 lb, 83.00c; 200 to 500 lb, 83.50c; less than 200 lb, 84.00c; ball, 1000 lb and over, 84.75c; 500 lb to 1000 lb, 85.25c; 200 to 500 lb, 85.75c; less than 200 lb, 86.25c, fob Sewaren, N. J.

Tin Chloride: 400 lb bbls, nom., fob Grasselli, N. J.; 100 lb kegs, nom.

Sodium Stannate: In 100 or 200 lb. drum, 49.00c; 4 to 11 kegs, 47.00c; 12 to 20 kegs, 44.30c; 21 kegs and over, 43.50c; in 350-lb bbl, 46.50c; 4 to 5 bbls, 43.80c; 6 bbls and over, 43.00c; fob Chicago, freight allowed east of Mississippi on 100 lb and over.

Zinc Cyanide: 100-lb drums, 35.00c, fob Cleveland; 34.00c, fob Niagara Falls.

Scrap Metals

BRASS MILL ALLOWANCES

Prices for less than 15,000 lb fob shipping point. Add ¾c for 15,000-40,000 lb; 1c for 40,000 or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	17.125	17.125	16.375
Yellow brass	13.750	13.250	12.875
Commercial Bronze			
95%	15.875	15.625	15.125
90%	15.750	15.500	15.000
Red brass			
85%	15.500	15.250	14.750
80%	15.375	15.125	14.625
Best Quality (71-79%)	14.625	14.375	.....
Muntz metal	12.875	12.625	12.125
Nickel silver, 5%	14.500	14.250	7.250
Phos. bronze, A. B.	18.125	17.875	16.875
Naval brass	13.250	13.000	12.500
Manganese bronze	13.250	13.000	12.375

BRASS INGOT MAKERS' BUYING PRICES

(Cents per pound, fob shipping point, carload lots)

No. 1 copper 17.00, No. 2 copper 16.00, light copper 15.00, composition red brass 16.00, auto radiators 13.00, heavy yellow brass 11.50, brass pipe 12.00.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper, 18.50c; No. 2 copper, 17.25c; light copper, 16.25c; refinery brass (60% copper), per dry copper content, 15.62½c.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

Copper and Brass: Heavy copper and wire, No. 1 15.50-16.00; No. 2 14.50-15.00; light copper 13.50-14.00, No. 1 composition red brass 14.00-14.50, No. 1 composition turnings 13.00-13.50, mixed brass turnings 9.50-10.00, new brass clippings 13.00-13.50, No. 1 brass rod turnings 11.75-12.25, light brass 8.00-8.50, heavy yellow brass 10.00-10.50, new brass rod ends 12.00-12.50, auto radiators, unsweated, 11.00-11.50, clean red car boxes 12.50-13.00, cocks and faucets 11.75-12.00, brass pipe 11.50-11.75.

Lead: Heavy lead 11.25-11.50, battery plates 6.50-6.75, linotype and stereotype 13.50-14.00, electrotype 11.50-12.00, mixed babbitt 12.00-12.50, solder joints 13.50-14.00.

Zinc: Old zinc 5.50-6.00, new die cast scrap 5.50-6.00, old die cast scrap 4.00-4.50.

Tin: No. 1 pewter 44.00-45.00, block tin pipe 60.00-62.00, auto babbitt 35.00-36.00, No. 1 babbitt 35.00-38.00, siphon tops 38.00-40.00.

Aluminum: Clippings, 2S, 9.50-10.00, old sheets 7.50-8.00, crankcases 7.50-8.00, turnings 3.00, pistons, free of struts, 6.75-7.00.

Nickel: Anodes 19.50-20.50, turnings 16.50-17.50, rod ends 19.00-20.00.

Monel: Clippings 14.00-15.00, turnings 9.00, old sheet 12.00-13.00, rods 12.50-13.00, castings 10.00.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

*PITTSBURGH:

No. 1 Heavy Melt. Steel	$35.00
No. 2 Heavy Melt. Steel	35.00
No. 1 Busheling	35.00
Nos. 1, 2 & 3 Bundles	35.00
Machine Shop Turnings	28.50-29.50
Mixed Borings, Turnings	28.50-29.50
Short Shovel Turnings	30.00-31.00
Cast Iron Borings	29.00-30.00
Bar Crops and Plate	38.00-39.00
Low Phos. Cast Steel	38.00-39.00
Punchings & Plate Scrap	38.00-39.00
Elec. Furnace Bundles	36.00-36.50
Heavy Turnings	34.00-34.50
Alloy Free Turnings	34.00-34.50
Cut Structurals	37.50-38.00
No. 1 Chemical Borings	33.50-36.50

Cast Iron Grades

No. 1 Cupola	42.00-43.00
Charging Box Cast	38.00-38.50
Heavy Breakable Cast	35.50-36.50
Stove Plate	42.00-43.00
Unstripped Motor Blocks	40.50-41.50
Malleable	46.00-47.00
Brake Shoes	31.00-34.50
Clean Auto Cast	46.00-48.00
No. 1 Wheels	40.00-41.00
Burnt Cast	35.00-36.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	35.00
R.R. Malleable	47.00-48.00
Axles	41.00-42.00
Rails, Rerolling	38.00-39.00
Rails, Random Lengths	35.50-39.50
Rails, 3 ft and under	37.50-42.00
Rails, 18 in. and under	38.75-43.00
Railroad Specialties	38.50-42.50
Uncut Tires	38.50-40.50
Angles, Splice Bars	37.00-42.00

* Prices for steelmaking grades from remote points range up to $40, including $7 to $8 freight.

CLEVELAND:

No. 1 Heavy Melt. Steel	$32.50
No. 2 Heavy Melt Steel	32.50
No. 1 Busheling	32.50
Nos. 1 & 2 Bundles	32.50
Machine Shop Turnings	26.00
Mixed Borings, Turnings	26.00
Short Shovel Turnings	26.50
Cast Iron Borings	25.50-26.50
Bar Crops and Plate	35.00
Cast Steel	35.00
Punchings & Plate Scrap	35.00
Elec. Furnace Bundles	33.50
Heavy Turnings	30.00
Alloy Free Turnings	28.50
Cut Structurals	35.00
No. 1 Chemical Borings	29.50

Cast Iron Grades

No. 1 Cupola	43.00-45.00
Charging Box Cast	41.00-42.00
Heavy Breakable Cast	40.00-41.00
Stove Plate	39.00-40.00
Unstripped Motor Blocks	42.00
Malleable	44.00-46.00
Brake Shoes	30.00
Clean Auto Cast	45.00
No. 1 Wheels	38.00
Burnt Cast	34.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	32.50
R. R. Malleable	45.00
Rails, Rerolling	35.00-36.00
Rails, Random Lengths	38.00-39.00
Rails, 3 ft and under	39.00
Railroad Specialties	30.50
Uncut Tires	36.50
Angles, Splice Bars	28.50

VALLEY:

No. 1 Heavy Melt. Steel	$35.00
No. 2 Heavy Melt. Steel	35.00
No. 1 Bundles	35.00
Machine Shop Turnings	27.50-29.00
Short Shovel Turnings	30.00
Cast Iron Borings	29.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	35.00

MANSFIELD:

Machine Shop Turnings	$26.00
Short Shovel Turnings	28.00

CINCINNATI:

No. 1 Heavy Melt. Steel	$32.50
No. 2 Heavy Melt. Steel	32.50
No. 1 Busheling	32.50
No. 1 Bundles	32.50
No. 2 Bundles	32.50
Machine Shop Turnings.	25.00
Mixed Borings, Turnings	23.00
Short Shovel Turnings.	26.00
Cast Iron Borings	24.00

Cast Iron Grades

No. 1 Cupola Cast	42.00
Charging Box Cast	35.00
Heavy Breakable Cast.	36.00
Stove Plate	31.00
Unstripped Motor Blocks	32.00
Brake Shoes	28.00
Clean Auto Cast	40.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	33.00
R.R. Malleable	40.00
Rails, Rerolling	38.00
Rails, Random Lengths.	38.00
Rails, 18 in. and under.	42.00

DETROIT:

(Dealers buying prices, fob shipping point)

No. 1 Heavy Melt. Steel	$30.50-31.00
No. 1 Busheling	30.50-31.00
Nos. 1 & 2 Bundles	30.50-31.00
No. 3 Bundles	30.50-31.00
Machine Shop Turnings.	23.50-24.00
Mixed Borings, Turnings	23.50-24.00
Short Shovel Turnings.	24.50-25.00
Cast Iron Borings	24.50-25.00
Punchings & Plate Scrap	33.00-35.00
Elec. Furnace Bundles.	32.00

Cast Iron Grades

No. 1 Cupola Cast	$39.00-41.00
Heavy Breakable Cast.	32.00-34.00
Clean Auto Cast	39.00-41.00

BUFFALO:

No. 1 Heavy Melt. Steel	$35.00
No. 2 Heavy Melt. Steel	35.00
No. 1 Busheling	35.00
Nos. 1 & 2 Bundles	35.00
No. 3 Bundles	30.00-31.00
Machine Shop Turnings	28.00-29.00
Mixed Borings, Turnings	28.00-29.00
Short Shovel Turnings	30.00-31.00
Cast Iron Borings	27.00-28.00
Punchings & Plate Scrap	36.00-38.00
Elec. Furnace Bundles	35.50-36.50
Alloy Free Turnings	33.00-34.00

Cast Iron Grades

No. 1 Cupola Cast	38.00-42.00
Charging Box Cast	36.50-38.50
Stove Plate	38.00-40.00
Malleable	40.00-42.00
Clean Auto Cast	38.00-42.00
No. 1 Wheels	38.00-40.00

PHILADELPHIA:

No. 1 Heavy Melt. Steel	$34.00
No. 2 Heavy Melt. Steel	34.00
No. 1 Busheling	34.00
Nos. 1 & 2 Bundles	34.00
No. 3 Bundles	31.50
Machine Shop Turnings	27.50-28.00
Mixed Borings, Turnings	25.50-26.00
Short Shovel Turnings.	27.50-28.00
Cast Iron Borings	27.50-28.00
Bar Crops and Plate	38.50-39.00
Cast Steel	38.50-39.00
Punchings & Plate Scrap	38.50-39.00
Elec. Furnace Bundles.	37.50-38.00
Heavy Turnings	35.00
Cut Structurals	37.00-37.50
No. 1 Chemical Borings	31.50-32.00

Cast Iron Grades

No. 1 Cupola Cast	46.00-47.00
Charging Box Cast	44.50-45.00
Heavy Breakable Cast.	44.50-45.00
Unstripped Motor Blocks	42.00
Malleable	49.00-50.00
Clean Auto Cast	46.00-47.00
No. 1 Wheels	46.00-47.00

NEW YORK:

(Dealers buying prices, fob shipping points)

No. 1 Heavy Melt. Steel	$31.50-32.00
No. 2 Heavy Melt. Steel	31.50-32.00
No. 1 Busheling	31.50-32.00
Nos. 1 & 2 Bundles	31.50-32.00
No. 3 Bundles	29.00
Machine Shop Turnings	24.00
Mixed Borings, Turnings	24.00
Short Shovel Turnings.	26.00
Punchings & Plate Scrap	34.00-35.00
Elec. Furnace Bundles.	33.00-33.50
Cut Structurals	34.00-35.00
No. 1 Chemical Borings	23.00-24.00

Cast Iron Grades

No. 1 Cupola Cast	40.00-41.00
Charging Box Cast	40.00-41.00
Unstripped Motor Blocks	37.50-38.00
Malleable	41.00-42.00

BOSTON:

(Fob shipping points)

No. 1 Heavy Melt. Steel	$30.00-31.00
No. 2 Heavy Melt. Steel	30.00-31.00
No. 1 Busheling	30.00-31.00
Nos. 1 & 2 Bundles	30.00-31.00
No. 3 Bundles	25.00-26.00
Machine Shop Turnings	24.00
Mixed Borings, Turnings	21.00-22.00
Short Shovel Turnings.	24.00-26.00
Cast Iron Borings	20.00-21.00
Bar Crops and Plate	32.50-33.50
Cast Steel	29.35-29.85
Punchings & Plate Scrap	32.50-33.50
Elec. Furnace Bundles	30.00
Heavy Turnings	30.00
Alloy Free Turnings	26.00
Cut Structurals	29.00
No. 1 Chemical Borings	23.00-24.00

Cast Iron Grades

No. 1 Cupola Cast	42.00-44.00
Charging Box Cast	36.00-38.00
Heavy Breakable Cast.	42.00-44.00
Stove Plate	39.00-40.00
Clean Auto Cast	38.00-40.00

CHICAGO:

No. 1 Heavy Melt. Steel	$32.50
No. 2 Heavy Melt. Steel	32.50
Nos. 1 & 3 Bundles	32.50
No. 3 Bundles	30.50
Machine Shop Turnings	27.00-28.00
Mixed Borings, Turnings	27.00-28.00
Short Shovel Turnings	28.00-29.00
Cast Iron Borings	28.00-29.00
Bar Crops and Plate	35.00
Cast Steel	35.00
Punchings	35.00
Elec. Furnace Bundles.	33.50
Heavy Turnings	32.00
Cut Structurals	35.00

Cast Iron Grades

No. 1 Cupola Cast	40.00-45.00
Malleable	40.00-45.00
Clean Auto Cast	35.00-40.00

Railroad Scrap

No. 1 R.R. Heavy Melt.	33.50
Rails, Rerolling	38.00-39.00
Rails, Random Lengths	37.00-38.00
Rails, 3 ft. and under	40.00-41.00
Rails, 18 in. and under	41.00-42.00
Railroad Specialties	37.00-39.00
Angles, Splice Bars	36.00-38.00

ST. LOUIS:

No. 1 Heavy Melt. Steel	$32.25-33.00
No. 2 Heavy Melt. Steel	32.25-33.00
Machine Shop Turnings	27.25-27.75
Short Shovel Turnings	29.25-29.75

Cast Iron Grades (Fob shipping point)

No. 1 Cupola Cast	35.00-37.00
Charging Box Cast	30.00-35.00
Heavy Breakable Cast	30.00-32.00
Stove Plate	29.00-34.00
Brake Shoes	28.75-31.00
Clean Auto Cast	35.00-37.00
No. 1 Wheels	34.50-36.50
Burnt Cast	25.00-30.00

Railroad Scrap

R.R. Malleable	41.00-42.00
Rails, Rerolling	40.00-42.00
Rails, Random Lengths	37.00-40.00
Rails, 3 ft. and under	40.00-43.00
Uncut Tires	34.50-36.50
Angles, Splice Bars	37.00-38.00

BIRMINGHAM:

No. 1 Heavy Melt. Steel	$29.00-29.50
No. 2 Heavy Melt. Steel	29.00-29.50
No. 1 Busheling	29.00-29.50
Nos. 1 & 2 Bundles	29.00-29.50
No. 3 Bundles	27.50-28.00
Machine Shop Turnings	21.00-21.50
Mixed Borings, Turnings	23.00-23.50
Short Shovel Turnings.	23.00-23.50
Cast Iron Borings	21.00-21.50
Bar Crops and Plate	31.00-31.50
Punchings & Plate Scrap	31.00-31.50
Cut Structurals	31.00-32.50
No. 1 Chemical Borings	21.00-21.50

Cast Iron Grades

No. 1 Cupola Cast	37.50-38.00

Railroad Scrap

No. 1 R.R. Heavy Melt	29.50-30.00
R.R. Malleable	37.50-38.00
Rails, Rerolling	33.00-33.50
Rails, Random Length.	30.00-30.50
Rails, 3 ft. and under	32.50-33.00
Rails, 18 in. and under.	33.50-34.00
Angles and Splice Bars	33.50-34.00

SAN FRANCISCO:

No. 1 Heavy Melt. Steel	*$19.50
No. 2 Heavy Melt. Steel	*19.50
No. 1 Busheling	19.50
Nos. 1 & 2 Bundles	*19.50
No. 3 Bundles	10.00
Machine Shop Turnings	8.00
Bar Crops and Plate	18.00
Cast Steel	18.00
Alloy Free Turnings	8.00
Cut Structurals	20.00-20.50
Tin Can Bundles	17.00

Railroad Scrap

Axles	26.50
Rails, Random Lengths	21.00
Uncut Tires	28.00

* Fob shipping point.

SEATTLE:

No. 1 Heavy Melt. Steel	$19.00
No. 2 Heavy Melt. Steel	19.00
No. 1 Busheling	19.00
Nos. 1 & 2 Bundles	19.00
No. 3 Bundles	17.00
Machine Shop Turnings	11.50
Mixed Borings, Turnings	11.50
Punchings & Plate Scrap	21.50
Cut Structurals	21.50

Cast Iron Grades

No. 1 Cupola Cast	27.50
Charging Box Cast	22.50
Heavy Breakable Cast.	21.50
Stove Plate	25.50
Unstripped Motor Blocks	21.50
Malleable	27.50
Brake Shoes	27.50
Clean Auto Cast	27.50
No. 1 Wheels	24.00

Railroad Scrap

No. 1 R. R. Heavy Melt	20.00
Railroad Malleable	27.50
Rails, Random Lengths	20.00
Angles and Splice Bars	21.50

LOS ANGELES:

No. 1 Heavy Melt. Steel	$16.50
No. 2 Heavy Melt Steel	15.50
Nos. 1 & 2 Bundles	14.50
Machine Shop Turnings	8.00
Mixed Borings, Turnings	8.00

Cast Iron Grades

No. 1 Cupola Cast	30.00

SPECIAL BLOCKING 50% FERRO SILICON

A Mark OF METALLURGICAL PROGRESS

Mark OF AN IMPORTANT COST-CUTTING DEVELOPMENT

• Ohio Ferro-Alloys Special Blocking 50% Ferro-Silicon is specially made to penetrate the slag . . . blocks heats faster . . . economical.

OTHER ADVANTAGES

- 1/5 to 1/3 less material to be handled
- Temperature of bath not affected
- No change in blocking practice required
- Inventories reduced—may be used wherever 50% ferro silicon is employed

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FERRO-SILICON 50% - 75% - 85% - 90%
SPECIAL BLOCKING 50% FERRO-SILICON
H. C. FERRO-CHROMIUM • FERRO-MANGANESE
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SILICON • MANGANESE • CHROME

Ohio Ferro-Alloys Corporation
Canton, Ohio
Chicago Detroit Pittsburgh San Francisco Tacoma

Sheets, Strip . . .

Cold-finished spring steel and alloy strip price schedules revised

Sheet & Strip Prices, Page 140

Pittsburgh—Cold-finished spring steel prices have been revised as follows: 0.26 to 0.40 per cent carbon $3.20; over 0.40 to 0.60 carbon $4.70; and over 0.60 to 0.80 per cent carbon, $5.30. Formerly, the base prices were $3.05 in carbon range 0.26 to 0.50 per cent; $4.30, 0.51 to 0.75 per cent; $6.15, 0.76 to 1 per cent; and $8.35 for over 1 per cent carbon.

Sharon Steel Corp. has reverted to former price base of $4.70 on hot-rolled alloy strip and $9.45 on cold-rolled alloy strip (in effect prior to the 8.2 per cent increase applicable on base price and extras granted under OPA) and have issued a new extra card covering both hot and cold-rolled alloy strip. Substantial advances are noted in most grade classification extras for both hot and cold-rolled alloy strip, although in a few instances they have been reduced such as the AISI E9315. The new size extras are comparable to those recently established on carbon strip.

Quantity extras for hot and cold-rolled alloy strip have been increased 5 cents to 20 cents in range under 5 to 3 net tons inclusive; 15 cents to 35 cents under 3 to 2 tons; 40 cents to 75 cents under 2 to 1; 35 cents to $1 under 1 net ton to 1000 pounds; and 25 cents to $1.50 under 1000 to 500 pounds inclusive.

Extras for closer than standard camber tolerances and for machine straightening hot-rolled alloy strip have been advanced as follows: 70 cents to $1 under ¼-pound per linear foot; 50 cents to 75 cents for ¼ to ½-pound; 40 cents to 60 cents over ½ to ¾-pound; 30 cents to 45 cents over ¾ to 2 pounds; and 20 cents to 30 cents over 2 pounds per lineal foot.

New extras for paper shrouding and wrapping, ranging from 5 to 25 cents, have been established on both hot and cold-rolled alloy strip; also the boxing extra is now $10 per box. Extras for circles, pickling, oiling and cutting are comparable to new carbon strip schedule for both hot and cold-rolled.

Increase in cold-rolled alloy strip size extras range up to 20 per cent, with largest advances noted in thinner gages. Sharon has eliminated Nos. 4, 5 and 6 cold-rolled strip edges, and has increased the extra for best bright finish.

New York—While steel mills have agreed to supply on a voluntary basis 304,000 tons in the second quarter for essential housing requirements, some consumers of sheets are keeping their fingers crossed as to the effectiveness of such a plan. Some who have recently received quotas for next quarter declare they are being scheduled for considerably less tonnage from certain mills than they are receiving in the present quarter under the priority system which now prevails. They admit it is possible some adjustments may be made as the next period approaches, but state that so far they have received no such intimations.

Interests who are somewhat skeptical as to the effective operation of the voluntary program for distributing steel for housing requirements in the next quarter declare it is a much more difficult thing to do than distributing railroad equipment steel on a voluntary basis, for the reason that more consumers are involved, and that a number are devoting only a portion of production to critical requirements.

Chicago — Shortage of sheets is limiting manufacturing operations in many plants and there is no reason to believe the situation can undergo improvement any time soon. Mills are producing at a high level and are shipping with minimum delay despite car shortages which develop from time to time. Shortages of sheets have forced consumers in many instances to seek supplies from whatever source obtainable, even to paying excessive prices in the so-called "black market." Transactions of the latter type, however, are most unsatisfactory and are not always fulfilled by the party offering the sheets.

Philadelphia — Sheet consumers continue to operate on a restricted basis, and as second quarter quotas show little change in most instances, they anticipate no early improvement in their output. The new railroad allocations have improved the position of some fabricators but at the expense of others, and especially where some strip mill capacity is again having to be diverted to plates in order to meet commitments for this same railroad program. Inability to get certain new sheet producing facilities into operation because of continued difficulty in getting electrical equipment is proving to be a severe handicap.

Cincinnati — Steel production at district sheet mills is near capacity in the effort to deliver as much of the first quarter commitments as possible. Carryover of hot-rolled tonnage, into the second quarter, may run to 30 days, but on other grades the carryovers have been cut to two weeks. This situation is a vast improvement over the Jan. 1 tonnage and gives mills better leeway on second quarter allotments.

Birmingham — Sheets grow progressively tighter. Demand is widespread and covers a variety of processing operations with the result that sheets are not in even approximately sufficient demand. The urge for roofing sheets has tapered off somewhat due largely to the fact that general repair work has been slowed down. Some tonnage in strip is being produced preparatory to the cotton baling season.

St. Louis—Sheet production is creeping upward under the stimulus of more settled labor conditions and increased productivity. Generally the major factors in production are unchanged but there is a noticeable trend toward prewar efficiency. Inquiries for steel continue on the upgrade but 1947 order books remain closed while mills attempt to gain ground on the seven to eight months order backlog. Demand is urgent, particularly for housing steel. Increased cold rolling capacity is expected to raise sheet tonnage by around 20 per cent in May.

Housing To Take 305,000 Tons of Steel Next Quarter

About 305,000 tons of steel will be made available to manufacturers of critically needed housing products in the second quarter of 1947 under a plan worked out with the steel industry representatives, John C. Houston Jr., commissioner of civilian production, announced recently.

The new program replaces the formalized priority program previously in operation for housing products. The 305,000 tons is expected to provide sufficient steel in the second quarter for about 300,000 homes, including about 4000 steel prefabricated houses. The first quarter priorities program called for 295,000 tons of steel.

Plates . . .

Shipyards branch out into other metalworking fields . . . Light plates remain scarce

Plate Prices, Page 141

Boston—Shipbuilders, heaviest users of plates in war-years, have lost this distinction, but with well equipped machine and metalworking shops available, several yards are resisting usual peacetime doldrums. Bath Iron Works Corp. has organized a subsidiary for the manufacture of vending machines, among other new products, for the distribution of packaged goods. Electric Boat Co. Groton, Conn., has branched out into other fabricated products, including structural steel. These new products will take less plate tonnage, but broaden the use of steel by shipyards. At Groton for instance, production of truck bodies trailers has bolstered floor plate requirements substantially. Neither yard is retiring from shipbuilding and Bath, in fact has considerable steel trawler volume. A new builder of textile looms at Lowell Mass., is also a prospective consumer of plates through use of weldments for machine bases. Worst shortage in plates continues to be in lighter tank quality sizes and some producers will not make the progress expected against backlogs during next quarter because of freight car needs.

Pittsburgh—Impact of the freight car building and repair program, requiring 165,000 tons or more of steel products monthly, starting in April, will not affect production schedules uniformly among various steel producers. One large interest, for example, is not called upon to furnish more plate tonnage than already scheduled for the carriers, while in other instances substantial rejuggling of schedules will be necessary. The program, as now established, is criticized in so far as it does not specifically authorize the number of cars to be constructed by each car builder. A scramble for the limited amount of steel available is expected to develop, which in turn likely will result in unbalanced inventories among various car builders.

New York—Most consumers of plates except for railroad equipment builders are doubtful if they will get as much tonnage in the second quarter as they are now receiving. While they are hopeful that operations at the mills will be on a better basis, producers generally are about as far oversold as they were at the beginning of the year and at least some, in an effort to bring their schedules more in balance, are reducing the quotas.

Philadelphia — Some plate producers in meeting the heavier load soon to be imposed in meeting the expanded railroad equipment program are being forced to draw upon strip mill capacity at the

STEEL CAPACITY?

1. How much steelmaking capacity was added during the war?
2. How much money was spent? Where are the plants located?
3. What is steelmaking capacity today?
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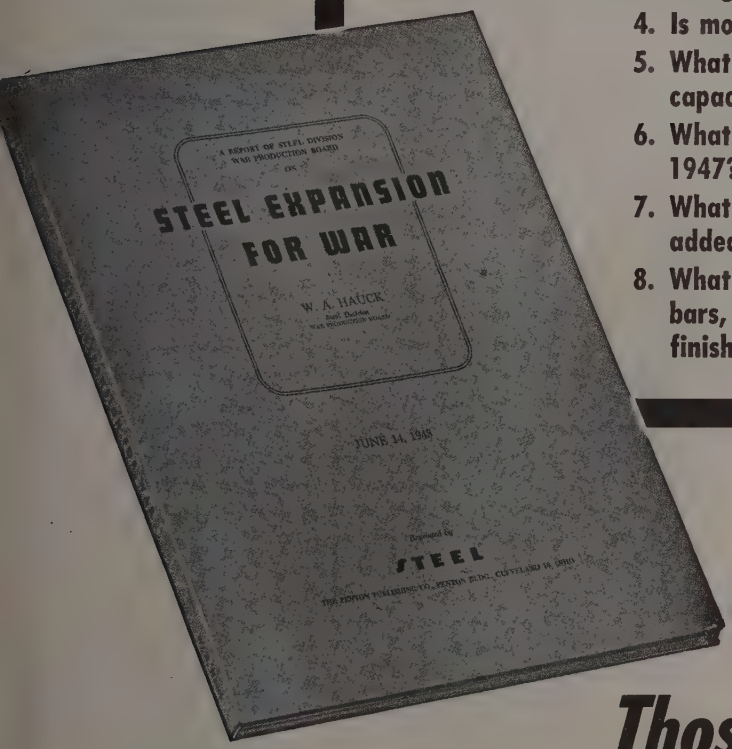

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AN OFFICIAL REPORT

Prepared by W. A. Hauck who was closely associated with the steel expansion program all through the war as a top executive of the Steel Division of the War Production Board and now is in charge of steel plant disposal for the War Assets Administration.

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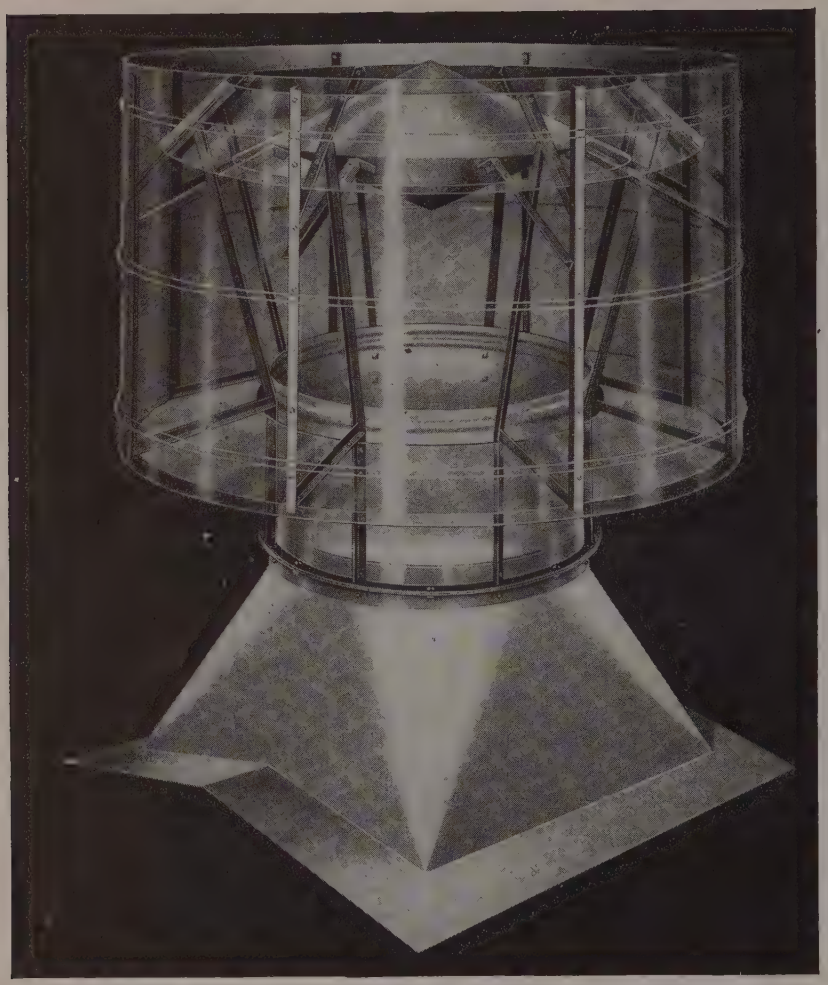

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expense of sheet and strip productio This has tended to support the opinio that while there will be no easing sheet and strip supply for months come, the plate situation may come in better balance sooner than anticipate especially a short time ago when the e panded railroad program was first b ginning to shape up. However, pla supply is nevertheless critical at prese with one large producer not having y been able to set up sales quotas for t entire second quarter. Certain mills, fact, are not only out of the market all practical intents and purposes, but a scaling down their future commitmen

Baltimore—Stringency in plates co tinues a surprise to many in the trad who had figured that once shipbuildi had ceased to be an important factor the would be appreciable easing in supp even though the strip mills devoted the production entirely to sheets and str However, plate demand has continued excess of production, with some mi booked up months ahead. Certain pr ducers are so oversold they are eith canceling a substantial portion of futu commitments or are setting back curre shipments three and four months.

Birmingham — Demand continu unabated for plates, especially in t lighter gages. The district's tank man facturers are especially busy with variety of specifications, including sk tanks, underground storage tanks for and gasoline and related products. Pla production gives no early indication catching up with demand, especially sin the general picture of activity in t South gives promise of being extend indefinitely.

Tin Plate . . .

Tin Plate Prices, Page 141

Pittsburgh — Tin plate producti schedules were little affected here duri the recent industrial gas shortage a present output is near capacity, althou freight car shortage is a threatening fa tor. Use of electrolytic tin plate is panding, the result of the dropping regulations governing use of tin conta ers for packaging food and nonfo products. Order backlogs for elect lytic tin plate are increasing as dema for coffee, dog food and similar ty containers expands.

Overall tin plate supply likely will main very tight throughout 1947 desp an increase in production facilities sch ules to be brought into service later t year. Indicative of this situation, t representatives of the Pittsburgh Equ able Meter Division, Rockwell Mfg. C this city, left recently for England an attempt to obtain badly needed hea gage tin plate for meter manufactu Company officials say tin meter ma facture has been hampered greatly cause it has been unable to obtain s ficient material.

Export directives are accentuating tight tin plate supply situation domestic consumers. This condition raised the question of legality of government to issue directives for sh ment after Mar. 31, the date warti directive powers are scheduled to abandoned.

Baltimore—One of the country's le ing consumers of tin plate, the district pressing hard for tonnage in an effort build up stocks for the food packing s

son. Shipments, however, are short of requirements.

Washington — Licensing of 65,000 tons of tin plate for export has been authorized by the Civilian Production Administration. This tonnage is in addition to the 55,000 tons authorized in September, 1946, against first quarter 1947 allocations. Orders licensed under this additional quota are being placed, with delivery of about 40,000 tons in April and the balance in May. The second quarter tonnage is expected to be announced soon.

Chicago — Tin mills in the northern Indiana district have returned to normal operations following curtailed schedules necessitated by the recent gas shortage. While box car shortage continues acute, a sufficient number have been provided by the railroad to keep production of tin plate shipped.

Structural Shapes . . .

Structural Shape Prices, Page 141

Boston — When Watertown arsenal asked bids on a moderate tonnage of structural steel recently, not a tender was received. Producers and warehouses are rationing tonnage sparingly, and between the two suppliers, fabricating shops manage to fill requirements for a substantial volume of small-lot contracts. Industrial consumers, in the main using a higher ratio of smaller sizes, including fabricators of air conditioning, materials handling, paper mill and other types of heavier plant equipment, are operating with low inventories. Although at least one power plant project is affected in postponements because of high costs, in, dustrial type of construction where earning power on investment is most promising immediately after completion is likely to be less curtailed than most commercial building. In this high cost factor, fabricated structural steel, while the highest in years, is but one of many contributing factors covering materials and labor.

Seattle — Fabricators are handicapped by shortages of steel and are unable to bid on some jobs involving large tonnages. Shops report a steady run of small orders. Inquiry is active and several major projects are up for figures, including buildings at the University of Washington. Shop managers expect the situation to ease as eastern mills increase production and it is hoped supplies will be normal by the yearend. Isaacson Iron Works, Seattle, is fabricating 100 tons for a storage garage in Seattle.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 140

Baltimore — Bar distributors declare supplies of reinforcing steel are easing, as a result of higher prices; however, these interests declare prices have been marked up to a point where consumers are showing resistance. Consequently, distributors would not be surprised to see some work held up, pending a thorough canvass as to whether shapes might not prove more economical, or pending decision as to whether to go ahead at this time.

Seattle — Inquiry for reinforcing bars continues heavy but many projects are still pending while builders revise plans to reduce costs or in the case of public works await additional funds.

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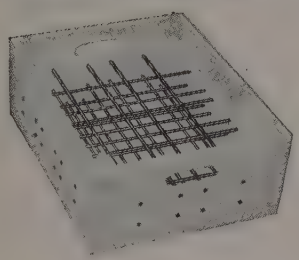

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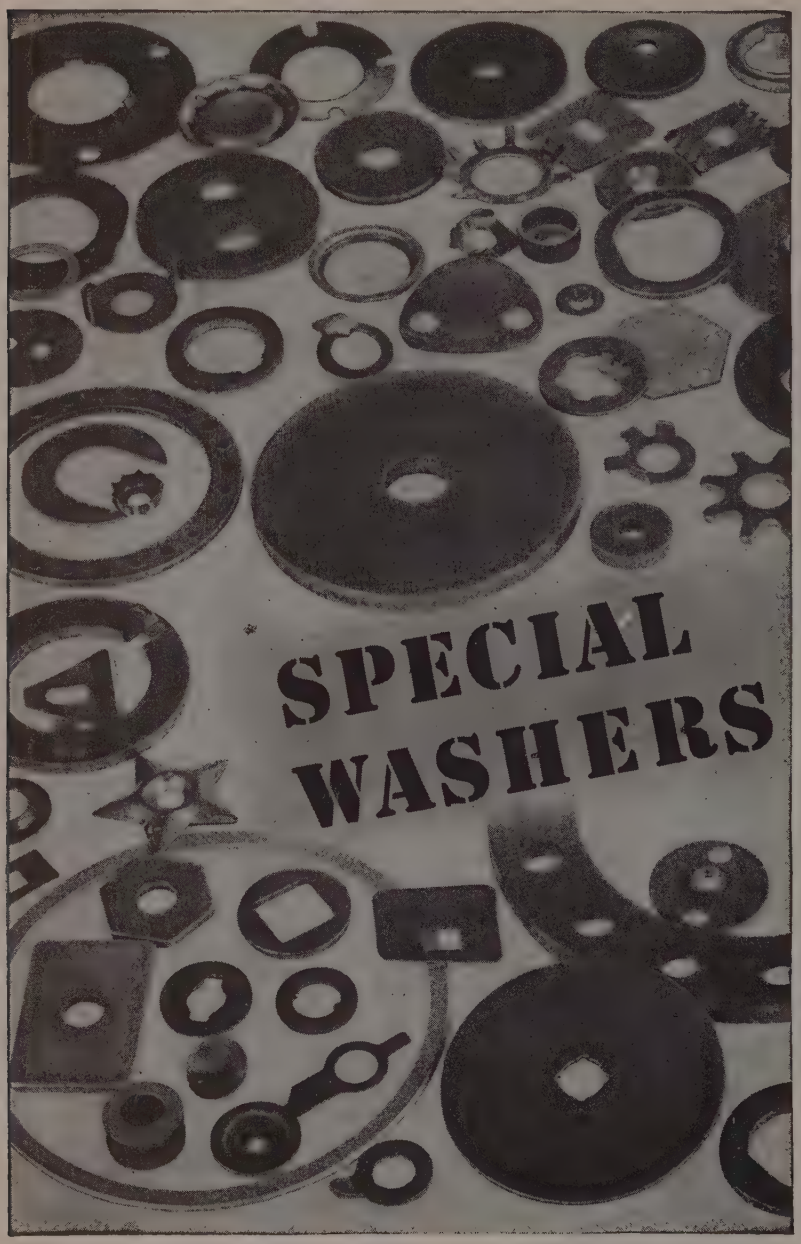

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Steel Bars . . .

Some producers making hea way in reducing order bac logs . . . Small sizes tight

Bar Prices, Page 140

Pittsburgh—Bar mill output has be larger in recent weeks than had be anticipated, making possible a reduct in order backlogs to a more realis basis. Some mills are hampered freight car shortages but this probl is not so severe as in other districts. So softening in demand for bars in la size ranges is noted. In smaller siz the supply remains very tight and d tribution continues under strict allo tion. In an effort to reduce freight sorption to a minimum, producers making a thorough study of bar s ranges produced at each price base, cluding types of finishes available. a number of instances producers are meeting competition at distant poi from their mills. Allocation of steel the Veterans' Housing Program is pected to be continued with little char on a voluntary basis after Mar. 31. T voluntary distribution plan calls for 30 000 tons of steel for second quarter, slightly more than scheduled this peri

New York—Apart from cold dra bars, there is no apparent easing in carbon bar situation and even in cert sizes of cold drawn steel, especially smaller rounds and in virtually the f range of flats and hexagons, there pears to be no improvement. Only the alloy grades are deliveries in gene easy, with promises on hot alloys c tinuing to run around five to six we on an average.

Seattle — Rolling mills are rece ing sufficient steel, despite scrap sho ages, to sustain opertions at about 90 p cent of capacity. Inquiry for mercha bars continues unabated with shipme moving freely and in larger than norm volume. Backlogs are still large, though they are being reduced gradual Regular customers and emerge projects are getting priority on mill o put. Higher price levels have not d couraged demand for any mill produ

Wire . . .

Wire Prices, Page 141

Chicago—Consumers of wire and w products are not only pressing for liveries but are seeking increases in th allocations from producers. The lat are unable to boost allocations in view extremely tight schedules. Light fen has become more difficult to sell, farmers, being in good financial positi demand heavier fence, or the best ava able. Expanding inquiries for bale t suggest early preparation for hay cro Recent ice and sleet storms have resu ed in replacement needs for communi tion wire. Rural electrification requi ments are only a part of what they wou be were conductors, transformers, ha ware and poles available. Demand wire rope is increasing and that for we ed mesh is strong. Because of box shortage, Joliet plant of American St & Wire Co. is getting about 20 per c in stock cars, and to make them servi able requires cleaning with air hamm and steam hose.

Birmingham—Although mills have

ined to disclose definitely what they ve in carryover backlogs in wire prodts, the total is large. This at attested to the fact that most distributors and jobrs are doing their best to placate cusmers by dividing allocation from week week in an effort to give them all a tle tonnage. Barbed wire and nails conue among the most critical items in is section.

ubular Goods . . .

Tubular Goods Prices, Page 141

St. Louis—Demand for pipe in all zes continues tremendous. Jobbers are creasing pressure on mills to raise bber quotas. By rejecting most of the ders offered, pipemakers have kept up ith quota deliveries fairly well, but are finitely unable to increase them. Botnecks in the construction industry here e multiplying, but the anticipated drop demand for housing pipe has not aterialized. Mills are booked ahead, nder the present quota system, through e third quarter and first half of the urth. Part of the pipe capacity here as been diverted to railroad freight r construction and repair. Industrial nstruction and expansion continues as e principal source of pressure. Export mand is heavy but largely goes unled.

imken Advances Prices on lloy Pressure Tubing

Steel & Tube Division, Timken Roller earing Co., Canton, O., has advanced ices on A.I.S.I. alloy pressure tubing ld on their schedule B-3. The adnce was made in accordance with the gher alloy steel prices previously anuced by leading producers. The new loy pressure tubing price schedule was fective on shipments made on and after b. 21. New quantity brackets are also fective on this schedule as follows:

Quantity Extras Pounds or Feet, Inclusive	Per Cent
40,000 or over	Base
25,000 to 39,999	5
12,000 to 24,999	12.5
6,000 to 11,999	25
3,000 to 5,999	40
1,500 to 2,999	60
500 to 1,499	80
499 or under	100

ron Ore . . .

Iron Ore Prices, Page 142

Cleveland — Unless there is an early pening of lake shipping, a tight situaon may develop in iron ore by late Apl or early May. This was indicated in e report on Lake Superior ore conmption and stocks, issued last week by e Lake Superior Iron Ore Association. his report showed that consumption is the highest level since March, 1945, hile stocks at the beginning of Febary were equivalent to only about four onths' needs at that consuming rate. Consumption of Lake Superior iron e increased to 7,023,856 gross tons in nuary, the highest since March, 1945, nen the total was 7,082,076 tons. Conmption in December was 5,516,483 ns and in January, 1946, only 3,718,-8 tons due to the steelworkers' strike.

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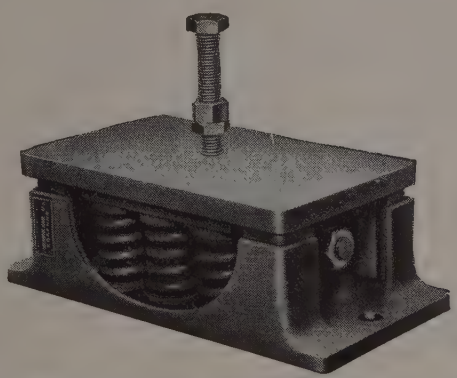

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Of last month's consumption, furnaces in this country accounted for 6,773,203 tons and those in Canada for 250,653.

Amount of ore stored at furnaces and on Lake Erie docks as of Feb. 1 was 30,514,072 tons compared with 35,341,615 tons a year ago. At the beginning of this month, 175 furnaces, eight of which are in Canada, were in blast against 176 on Jan. 1. Sixteen of those furnaces in the United States and two in Canada which depend on Lake Superior ore were idle. A year ago 195 furnaces used northern ores compared with 193 at present. The report mentions dismantling during 1946 of Carnegie-Illinois Steel Corp.'s No. 7 furnace at South Chicago and the Newberry Lumber & Chemical Co.'s stack at Newberry, Mich.

Discriminatory Allocation Of Pig Iron Charged

Discriminatory allocation of pig iron by the Civilian Production Administration for the first quarter of this year is directing 50 per cent of total merchant pig iron production to southern stove and cast iron pipe manufacturers, representing only 8 per cent of all users, Warner Gear Co., Muncie, Ind., charges, adding that Republic Steel Corp. has stated 87 per cent of its production of merchant iron is now so diverted.

Warner Gear Co., in sizing up the matter, observes the "situation is deplorable where one bureau can close a segment of industry or discriminate against one industry in favor of othe and urges "immediate action to once and for all bureaucratic regime tion and power that makes possible an dividual or a board closing any indu or group of industries in favor of an er, regardless of political expediency."

Pig Iron . . .

Active interest being sho in foreign offerings desp high asking prices

Pig Iron Prices, Page 142

New York—Pig iron supply contin to fall far short of requirements, a s ation that is giving rise to further spe lation as to what may be counted u in the way of foreign iron. Various ports are current concerning the m ment of iron to this country, particul from Poland and Great Britain; also respect to prices being asked.

So far with one or two exceptions cluding a recent lot of 200 tons rece from Poland at Boston, tonnages h been relatively small. Prices mentio in recent reports range around $75 around $77 per ton, fas port. In f an offering of $77.10 fas Philadelp is said to have been made recently.

A shipment of 500 tons of English i already sold, is scheduled for arrival New York shortly. As a mater of fac is said that all shipments to have b received in this country had been to consumers before arrival.

Most district foundries are opera on part time. This is true also of s foundries doing rated work, because the enforced suspension of operation a large Bethlehem, Pa., stack. This nace will be down for at least six eight weeks.

Pittsburgh—Pig iron prices have yet broken through to still higher le as some trade authorities predicted. spite increases in iron ore and prices since the last general pig price advance, and the wide spread tween scrap and pig iron prices, the dustry apparently is awaiting the come of current wage negotiations fore taking any further price act

Philadelphia — Majority of pig consumers in this district have never perienced such a shortage of tonnage, cept in a few instances occasioned by tion-wide strikes. This majority gr represents those who are not benef by ratings issued essentially for hous program requirements. At present, t difficulties are being increased by enforced suspension of a large stack Bethlehem, Pa., which probably will down for six to eight weeks. Wha proving most discouraging is the p pect that the shortage will continue a for at least several more months and foundry scrap will remain in tight s ply for some indefinite period to co with prices likely continuing excessiv high. Most consumers look for pig priorities to continue at least through the second quarter and those not gaged in preference work are still cli ing to the hope that some adjustm will be made that will ease their p tion. Meanwhile, some offerings of eign iron are being made, with Po iron for foundry use being offered $77.10, fas Philadelphia, and with E lish iron being reported offered at same figure. Much of the English

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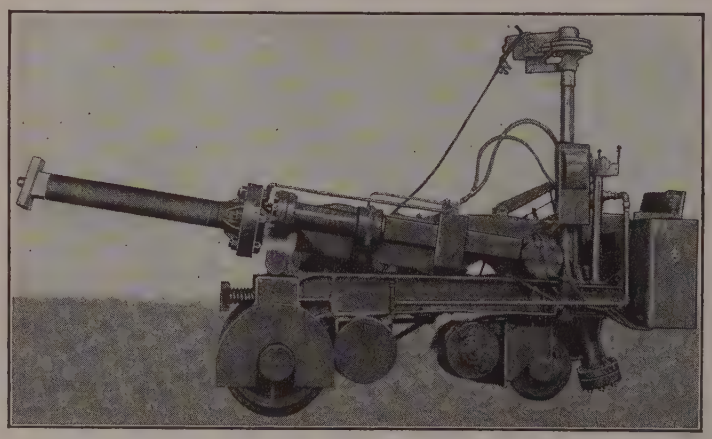

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now being offered runs as follows: Silicon 2.25 max.; carbon, 2.8 min.; sulphur, 0.05 min.; manganese, 1.25 max.; phosphorus 0.3 min. Some of the Polish iron offered carries the following specifications: Silicon 3.5 to 4; manganese 0.60 to 1; phosphorus 0.3 to 0.9; sulphur 0.03 to 0.05, and carbon 3.8 to 4.5. Some offerings of Dutch basic iron have been made for the first time, it is believed, since prior to the war. While no Dutch iron is now in transit, some limited amounts are being offered for fairly early shipment. Offerings from Finland have also been reported. However, in view of the exceptionally high prices being asked and the fact that most delivery promises are fairly extended, consumers in this district have covered on little foreign iron, so far as can be learned.

Boston — A slight easing in pig iron is due to imports for which a limited number of larger melters are paying close to $74 a ton, Boston. As supply from the Everett furnace improves, shipments from Buffalo and other points normally supplying tonnage to this area are well below normal. Currently melters in New England are paying the lowest prices in the East for foundry grades, but also the highest for foreign iron. At least 2000 tons of the latter a month is available. Most of the imported iron is being taken by textile mill equipment manufacturers who at a recent meeting took the view too much iron was being allocated for housing. This takes about 4500 tons from the Everett allocations each month, but most of the users getting this tonnage would normally share in part of the district furnace production.

Chicago — More and more foundries report pig iron as their operating bottleneck, and consequently are continuing to press distributors for shipments. Unable to obtain iron in adequate quantity, foundry operators have no idea whether they will fare better when allocations end Feb. 28. Distributors also appear to be on the fence over this question. Some quarters believe allocations may be continued beyond the end of February, but so far there is nothing definite on this point. Iron production is at its peak in this district at the moment, all capacity not undergoing repairs being in blast.

Buffalo—Lack of railroad cars reached the serious stage last week in the pig iron market. Foundries reported difficulty maintaining scheduled operations and pressed producers for iron shipments which were overdue. Complaints were heard of prolonged delays in cars returning from the East. A feature of the week was the announcement by Pratt & Letchworth, one of the East's leading railroad casters, that production of truck-axle castings had been resumed. Output of axle castings had been halted during the war. The company plans to produce axles on a much larger scale than in the prewar period. The company also reported a substantial order backlog for railroad castings.

Cincinnati—Foundries are hard pressed for pig iron, deliveries lagging behind schedules. The district melt has declined considerably below the January level despite attempts to utilize a larger proportion of scrap which has appeared in better supply. The demand for castings is sustained, with melters under pressure for deliveries. Backlogs, too, are extensive.

Birmingham—Survey of this industrial district indicates an overall need for not less than 50,000 additional tons of pig

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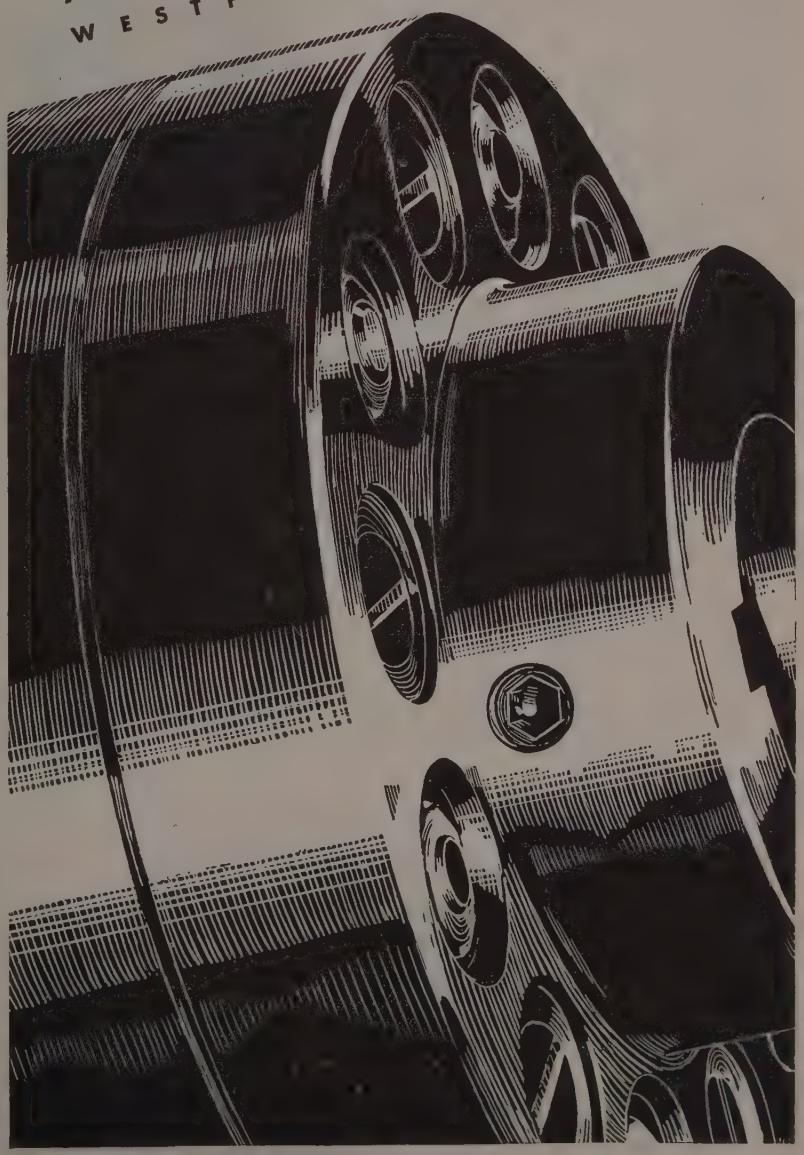

iron per month. With CPA certification in effect on top of the continuing shortage under even normal conditions, the squeeze in iron becomes daily more pronounced. Together with the shortage of gas because of unseasonably cold weather, the pig iron shortage has caused continued interruption of production schedules in pipe plants, foundries and related industries. Great concern over the situation is evident in industrial circles here.

St. Louis—Pig iron output holds at capacity. Supply is very tight, but better scrap deliveries plus more scrap content in the melt are pulling most consumers back from the brink of the curtailed operations they faced two weeks ago. Small melters, however, are not happy over the prospect the scheduled abolition of pig allocations will divert more of the available supply to the big users. About 40 per cent of blast furnace capacity currently is devoted to foundry iron and foundrymen fear their ratio may be decreased. Pig iron producers, however, deny such plans. Limited shipments here from the Birmingham district may be cut soon.

Seattle — Foundry executives met at San Francisco last week in an effort to ease the pig iron situation. This item is unfairly distributed in this area, it is claimed, and foundries are trying to reach an agreement with producers for allocation and larger supplies. Meanwhile, plants are operating on a day-to-day basis. Pig iron is practically unobtainable and cast iron is hard to get.

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Easier Situation Expected In Scrap Within 60 Days

Cleveland — Meeting of the direct of the Institute of Scrap Iron & St was held here last week at which pla were discussed for relieving the pr ent tight scrap supply situation, incl ing correction of maldistribution of ava able supply, elimination of tie-in sa with mills and special deals betwe mills and steel consumers.

No specific program was adopted, was reported in the trade, but efforts to be made to correct the distorti which have developed in the market recent months.

In the trade the view is expressed th actually scrap supply is comfortable present. High steel ingot operations pointed to as reflecting heavy consum tion of purchased scrap, in January the amount of approximately 2 mill tons, close to the record-breaking w time rate.

For the most part, its is said, corr tion of existing market distortions w quickly ease the pressure now evident demand and prices. Some observers p dict that in view of the current h rate of industrial scrap production, a prospects for increased collections w better weather, a definitely easier si ation should be apparent in scrap wit 60 days.

Scrap . . .

Scrap Prices, Page 146

Pittsburgh — Based on present r of ingot operations, movement of scr into this district must be continued large volume. Steel producers' scr supply position is not likely to record s nificant improvement until milder wea er permits more extensive collection a segregation of material. Railroad hea melting steel price is holding at $35 ton, but a wide discrepancy in pri for specialties is noted. The Penns vania Railroad recently awarded railr specialties at $38.50, while sales by oth carriers are reported up to $42.50; gles and splice bars, $37 to $42. So foundries report a slight easing in c scrap supply and a few state prices app to be leveling off. Based on repor market prices in the East, remote scr delivered here would top $40 per t However, considerable tonnage is shipp on tie-in sales at prices well below f mal eastern market prices. Effort to crease broker's commission from 50 ce to $1 is developing. Brokers most act in this move state commission is too sm for amount of money tied up in trans tions at present high prices, and c tend volume of business handled is nearly so great as might be imagin due to tie-in sales.

Boston — Steelmaking scrap has vanced to $31, shipping point, with ev higher prices reported paid. Oth grades have joined the advance, incl ing turnings at $24 and short shovel turnings, $26. As high as $39 is be paid for motor blocks. No. 1 cast ha ers around $45 delivered.

Chicago — Prices for scrap are ho ing firm in this market. There is a co paratively stable flow of material to st mills which are operating at 92 per c of capacity, a figure that is close to peacetime high. Despite the recent ra rise in scrap prices, it cannot be s

ey have resulted in any marked in-ease in tonnage coming into the mar-et. Unable to get all the scrap they eed, from normal channels, mills have ad to get manufacturers to whom they ip finished steel to earmark scrap to em. Mills complain, however, that when ese transactions are handled through okers some of the earmarked tonnage es astray, a condition that has encour-ged a certain amount of direct ship-ents from steel consumer to steelmak-

Philadelphia — District consumers are ported as not having paid more than 4, delivered, although brokers are pay-g this much in covering on old com-itments. Consequently, it would not e surprising, especially if adverse weath-conditions prevail, if the consumer arket advanced soon. During the past w days, delivered prices on various her grades, including turnings, low os and cast scrap, have been increased, some instances as much as $2 to $3 ton. The general advance in turnings ascribed in part to failure recently to ep pace with the market on heavy elting steel, a situation noted by con-mers outside as well as inside the dis-ict. The increase in low phos scrap so reflects an adjustment in the differen-al between this grade and heavy melt-g. As for cast grades, the further rength simply reflects the stringency in pply, not only in scrap but in pig iron well.

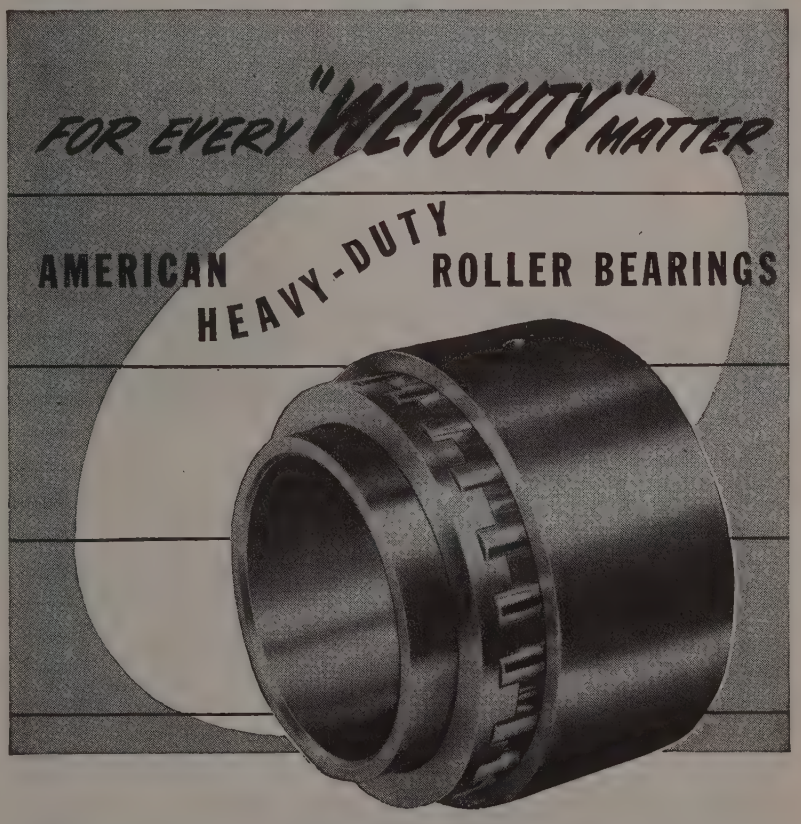
Movement of scrap to points outside e district, particularly to the Pittsburgh ea, has been principally in turnings. elatively little melting steel so far has ft the district, it is believed. Mean-hile, the flow of melting steel to dis-ict plants has been heavy, but still t sufficient to permit stocking. While eather so far this winter has been good this district considering the season, still ilder weather in the spring will un-ubtedly step up the flow.

The melting grades, busheling, Nos. and 2 bundles have firmed at a flat $34, livered, price, while No. 3 bundles are lding at $31.50. Machine shop turn-gs are $27.50 to $28; mixed borings d turnings, $25.50 to $26; short shov-ing and cast iron borings, $27.50 to 8; bar crops and plate, cast steel and nchings and plate scrap, $38.50 to 9; electric furnace bundles, $37.50 to 8; heavy turnings, $35; cut struc-rals, $37 to $37.50. No. 1 cupola cast $1 higher at $46 to $47, and charging x cast and heavy breakable cast at 4.50 to $45, delivered. Unstripped otor blocks are $42; malleable, $49 to 0; clean auto cast, $46 to $47; and . 1 wheels, $46 to $47.

New York — Brokers' buying prices e generally higher, with Nos. 1 and 2 avy melting steel, No. 1 busheling and s. 1 and 2 bundles now quoted $31.50 $32, fob shipping point. No. 3 bun-es are being quoted at $29, machine op turnings and mixed borings and mings at $24, and short shovel turn-gs at $26. Punchings and plate scrap ve been advanced to $34 to $35, elec-c furnace bundles to $33 to $33.50, d cut structurals to $34 to $35. No. 1 pola cast is higher at $40 to $41 and urging box cast is moving within that ne range. Unstripped motor blocks $34.50 to $38 and malleable $41 to 2.

Buffalo—Strength swept through the ap market here last week with sales No. 2 heavy melting and No. 2 bund-les reported at $35 a ton, an increase of $3. Corresponding price jumps were reported on sales of related items. Machine shop turnings sold at $28 to $29 while short shoveling turnings brought $30 to $31. Soaring prices were accompanied by confusion in other items. Prices varied anywhere from $35 to $45 a ton for No. 1 cupola, with the quoted range narrowed to $38 to $42. Malleable, in short supply, was traded in a seller's market with prices fluctuating within a $38 to $45 spread. Although insufficient scrap was blamed for a temporary shutdown of four open hearths by a leading mill consumer, improvement was noted in the overall supply situation. Leading dealers reported increases in shipping notices to mills. Hope is held now that ingot operations will be sustained until heavier scrap supplies become available in the spring.

Cleveland — Scrap market was described as "booming" in this district last week, although mill orders were still on the unchanged price basis of $32.50 for heavy melting grades. Brokers, however, claimed they were paying $1.50 to $2 a ton above that level and absorbing heavy freight charges from remote points to cover commitments. The market has been disrupted in recent weeks by buyers' "raids" on other than their normal sources of supply and by an increasingly large number of transactions involving exchange of finished steel for scrap. Strength in the market is attributed also to the fact that many mills must secure prompt shipments to avoid shutdowns of their open hearths.



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DRAWING AND FORMING DIES

THE ADVANCE FOUNDRY COMPANY
119 SEMINARY AVENUE — DAYTON 3, OHIO

Mills is this district have no more t
10 days' supply on hand.

Cincinnati—Prices of iron and s
scrap are higher, in adjustment to o
districts. Supplies are somewhat
proved with consequent shrinkage in
local market for remote tonnage. Dema
however, is great as foundries seek
terial to offset light shipments of
iron, and a steelmaker seeks to offse
part the cooling of a blast furnace
repairs. Collections during the winter h
not been seriously hampered here, an
the south have continued with few
terruptions.

Detroit—Scrap prices rose $2 last w
to $30.50-$31.00 on steel grades, $23
$24.00 on turnings and mixed bor
and turnings, $24.50-$25.00 on s
shoveling and cast iron borings, $33
$35.00 on punching and plate, $39
$41.00 on No. 1 cupola cast, $32
$34.00 on heavy breakable and $39
$41.00 on clean auto cast.

Market situation is highly confu
with dealers being forced to pay
premiums to cover short orders.
tonnage of heavy melting brought $32
delivered, at a local mill. Slight ea
of pressure on cast grades is repor
although prices are higher in line
the rest of the market.

Washington—President Truman as
Congress last week to extend until J
30, 1948, the law suspending im
duties on scrap iron, steel and rails.
tension was recommended "in view
the present shortage" pending consid
tion of permanent legislation.

Birmingham — Scrap prices, w
scoring no actual increase this week,
still tending upward. The price situa
is described as the most unpredictabl
history with heavy melting and the
ter grades of cast demanding price
some instances in excess of new finis
steel. Despite high prices, scarcity
tinues.

Warehouse . . .

Warehouse Prices, Page 143

Philadelphia—While some jobbers
port a better volume of tonnage f
the mills, still others assert their rece
have not been up to the daily rate of
month. Hence, it is still uncertain
to whether jobbing business in Febr
will show any improvement, on a d
basis, over January.

Baltimore—The tight situation w
prevails among warehouses is espec
significant. Distributors find it impos
to keep stocks in balance on sheets, s
shapes, bars and plates, among m
items. Much tonnage leaves the floo
moment it is received. Business since
first of the year has been better than
ing the previous period, reflecting b
mill production and, accordingly b
receipts.

St. Louis—Warehouse steel inve
ies are at the lowest point since the
Deliveries from mills generally are
schedule and improving, but qu
even if met in full, will provide
enough tonnage to satisfy part of
demand. Shipments occasionally
spotty, with individual rolling mill
porting production interruptions
increasing difficulty getting freight
Some warehouses are taking deliver
truck even though it means bottler
and jams at loading platforms. Pre
from fabricators threatened with

owns is terrific. Warehouses of late ave been facing a double squeeze; by uyers of manufactured goods who have een told by their suppliers they can ccept orders only if the customer will btain the steel for them. Sheets of all pes head the scarcity list, with plates, nall bars and bar shapes and struc-rals following. Alloy steels are in rela-ely good supply.

Seattle — Demand is steady for all bbing items but stocks are badly brok-n, sheets, pipe, reinforcing bars and ails being particularly scarce. Higher ices have not retarded buying. Cold-lled items, plates and shapes are easier t some items including mild steel bars, nall angles and bands are still on allo-tion. It is expected that by July the uation will approach normalcy, except r sheets on which no relief is antici-ted during 1947.

Rails, Cars . . .

Track Material Prices, Page 141

Several car awards, involving 18 to 00 units, respectively, have been an-ounced recently; also several inquiries, eatured by 1000 hopper cars for the linois Central. With steel supply for n indefinite period having been set up n a larger scale for railroad equipment uilders, it is believed that the general n of car demand will continue active r some time.

Domestic freight car awards in Jan-ry totaled 9905, according to the Amer-an Railway Car Institute. This figure mpared with a revised total of 3041 the preceding month and with a onthly average of 5744 in 1946.

The new orders included 4842 hop-ers and 3400 box cars. S. M. Felton, resident of the institute, pointed out at there have been increased orders for ese types over recent months and that ore than 20,000 box cars and 18,000 ppers are now on order. Total back-g of orders, as of Feb. 1, was 75,578 cluding orders placed with the car uilding industry and railroad shops, mpared with 40,670 a year previous.

January production of freight cars was sappointing to builders and reflected ntinued shortages of steel and other aterials. Deliveries totaled 2982, of hich 1227 were box cars, as compared ith a potential capacity production by e car builders of 14,000 cars monthly.

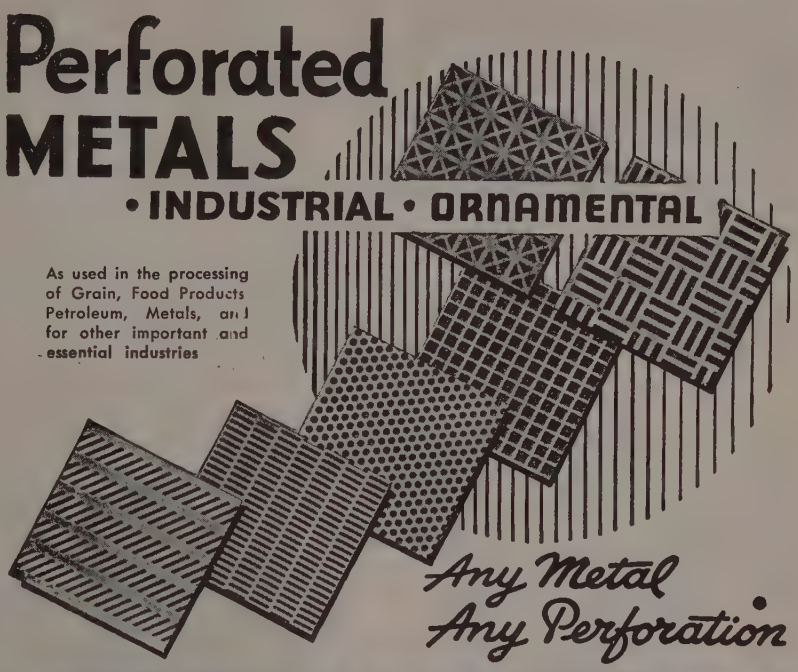
Comparative table, covering domestic eight car awards, follows:

	*1947	*1946	1945	1944
n.	9,905	1,500	7,200	1,020
b.	....	2,403	1,750	13,240
arch	....	4,512	2,500	6,510
pril	....	3,764	1,120	4,519
ay	....	3,025	1,526	1,952
ne	....	3,335	670	1,150
ly	....	14,836	3,500	795
g.	....	9,629	7,240	3,900
pt.	....	12,768	12,840	400
ct.	....	3,407	1,320	2,425
ov.	....	6,707	1,650	1,065
ec.	....	3,041	4,116	16,245
otal	....	†68,927	45,432	53,221

* American Railway Car Institute.
† Revised.

Chicago — A wheel and axle mill in his district went on overtime basis this month in an effort to increase produc-tion of these products. Presumably this step was taken to ease backlogs of these much needed commodities as well as in anticipation of the expanded car building program scheduled to start in April.

Perforated METALS
• INDUSTRIAL • ORNAMENTAL



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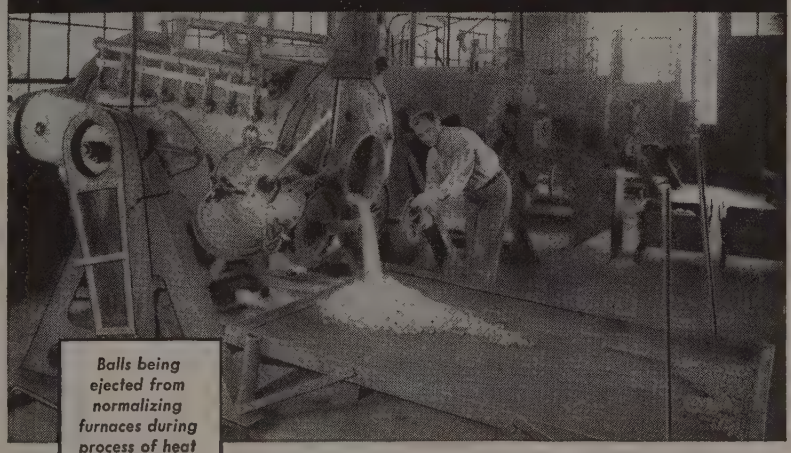
STROM BALLS For The Bearings Of Industry



Balls being ejected from normalizing furnaces during process of heat treating.

Industry continually seeks to perfect the performance of its products. That means that all parts must be brought up to higher and higher standards. It is especially important that the balls on which the bearings of industry run shall be of the highest standard of perfection. Strom Balls, in their unbelievably high qualities of finish, sphericity and precision—developed through exclusive concentration on making fine balls for 25 years—hold first place in American industry. Strom Steel Ball Co., 1850 So. 54th Ave., Cicero 50, Ill.

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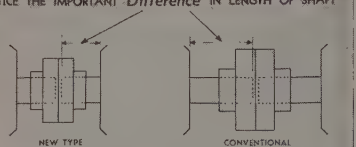

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It embodies all Waldron construction refinements. An all steel coupling that compensates for misalignment without adding stress to shaft or bearings.

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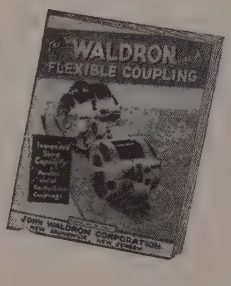

Catalog 57 contains full details and rating tables on following types: Standard, Heavy Duty, Mill Motor, Marine, Floating Shaft, Jordan, Shear Pin, Oil Collector, Cut Out. Write today.

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New Brunswick, N. J.

Sales Representatives in Principal Cities

Canada . . .

Toronto, Ont. — Shipments of primary shapes by Canadian mills totaled 246,547 net tons in November compared with 172,580 tons in October and 72,070 tons in September. The November total included 37,929 tons of semifinished shapes; 13,331, structurals; 17,351, plates; 22,574, rails; 53,135, bars; 10,776, pipes and tubes; 23,969, wire rods; 19,459, black sheets; 6324, galvanized sheets; 582, tool steel; 6364, castings; and 34,753, other shapes.

Steel Price Extras . . . . What They Are and Why

(*Concluded from Page* 49)

ing, chamfering, etch tests, freedom from decarburization, accuracy, boxing for domestic shipment, boxing for export, burlapping, etc. Probably not more than four or five of these are ever applied on the average order. Most of them are special-purpose extras.

Products such as bolts and nuts, furnace products, sheet piling, pipe, plates, rails and track accessories, reinforcement bars, structural shapes, sheet bars, sheets and strip, skelp, stainless and nitralloy, tin mill products, tool steels, wheels and axles, and wire and wire products all have their own types of extras applicable to the specific product.

Some customers ask for special features and conditions that come within the scope of special manufacturing practices such as special check analyses; special quality, extra restrictive check analyses, etc., which are even beyond the scale of ruling extras. These are charged for according to the specific requirements and are based upon the low yield from ingot with consequent reduced output, while necessitating constant expert supervision throughout the process of manufacture.

Among the more recently introduced inspection tests are those of magnetic analysis inspection; magnetic particle inspection; supersonic tests; x-ray inspection for internal flaws, etc.; photoelasticity with polarized light for stress evaluations, etc. Unquestionably more of these refined tests will come into use as the electronic and atomic sciences advance and eventually will be accepted as routine practice for those who require the prime-donna steels.

RAILS, CARS . . .

RAILROAD CARS PLACED

Adirondacks Bottled Gas Corp., 3 fifty-ton tank cars, to American Car & Foundry Co., New York.

Atlantic Coast Line, 50 fifty-ton passenger express refrigerator cars, to American Car & Foundry Co., New York.

Chicago & Eastern Illinois, 300 fifty-ton hopper cars, to Pullman-Standard Car Mfg. Co., Chicago.

Chicago, Rock Island & Pacific, 100 fifty-f six-inch auto box cars and 50 forty-foot inch auto box cars, to American Car Foundry Co., New York.

Consolidated Chemical Industries Inc., 10 t cars to American Car & Foundry Co., N York.

Delray Connecting Lines, 100 seventy-ton h per cars, to Greenville Steel Car Co., Gre ville, Pa.

General American Transportation Corp., forty-ton tank cars, 40 fifty-ton tank cars, seventy-ton tank cars, 4 seventy-ton cove hoppers and 10 forty-ton covered hoppers own shops.

Grand Trunk Western, 500 fifty-ton box c to Pullman-Standard Car Mfg. Co., Chic

Gulf Coast Lines, a subsidiary of Missouri cific, 50 fifty-ton auto cars to own shops.

Home Gas Corp., 3 fifty-ton tank cars, to Am can Car & Foundry Co., New York.

International Great Northern, a Missouri Pa subsidiary, 50 fifty-ton covered hopper c 50 fifty-ton auto cars and 50 forty-ton s cars to own shops.

Kansas City Southern, 800 fifty-ton box c to Pullman-Standard Car Mfg. Co., Chic

Minneapolis & St. Louis, 250 seventy-ton h per cars, to Pullman-Standard Car Mfg. Chicago.

Missouri-Illinois, 150 freight cars, to Ameri Car & Foundry Co., New York; this inclu 100 seventy-ton ballast cars, 35 seventy steel covered hopper cars and 15 seventy steel covered cement cars.

Missouri Pacific, 600 fifty-ton auto cars, seventy-ton covered hopper cars and 50 f ton gondolas to own shops.

Missouri Pacific, 18 seventy-ton container to its own shops.

Norfolk & Western, 100 seventy-ton cov hopper cars to own shops.

Norfolk & Western, 20 caboose cars, to its shops.

Pacific Gas Co., 50 forty-ton tank cars, American Car & Foundry Co., New York.

Seaboard Air Line, 500 fifty-ton box cars 175 seventy-ton phosphate cars, to Pull Standard Car Mfg. Co., Chicago.

Shippers Car Line, 120 fifty-ton tank cars American Car & Foundry Co., New Yor

Southern Pacific, 5100 freight cars with box cars going to Pullman-Standard Car Co., Chicago, 1500 box cars to American & Foundry Co., New York, 1500 gondola Pressed Steel Car Co., Pittsburgh, 500 dolas to Rallston Steel Car Co., Colum O., and 100 covered hopper cars to Ge American Transportation Corp., Chicago. pending for this railroad are 1100 freight

Spokane International, 2 seventy-ton ho cars to General American Transport Corp., Chicago.

RAILROAD CARS PENDING

Chicago, Indianapolis & Louisville, 100 f foot six-inch box cars, and 50 fifty-foot cars, bids asked.

Denver & Rio Grande Western, 300 to fifty-ton drop bottom gondola cars, asked.

Illinois Central, 1000 fifty-ton hopper cars, asked.

Seaboard Air Line, 300 seventy-ton ho cars, pending.

St. Louis South Western, 25 to 50 seventy covered hopper cars, bids asked.

Wabash, 500 fifty-ton box cars, pending.

LOCOMOTIVES PLACED

Virginian, four 6800-horsepower electric motives, to General Electric Co., Schenect N. Y.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

5275 tons, K St. elevated highway, Washin D. C.; also 7300 linear feet, metal ra bids Mar. 14, district commissioners.

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Alloy 99 SHOT

t does the job it was designed to do.....it does this job well.....*therefore, no product could have a better recommendation!*

Samples of Alloy 99 *shot and laboratory services available on request*

ALLOY METAL ABRASIVE CO.

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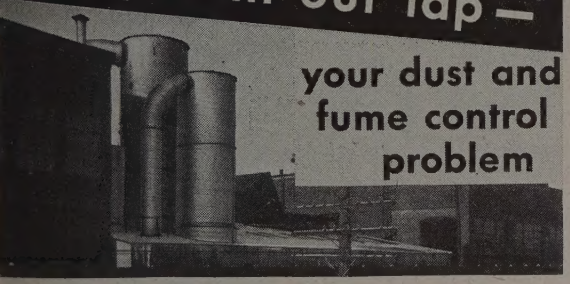

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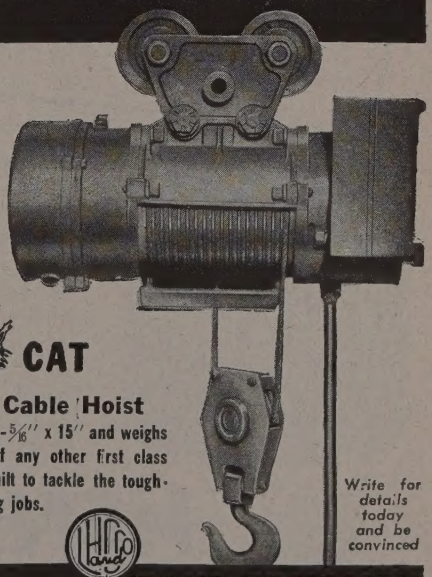

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PIONEERS OF BETTER HOISTS. LIFTING AND CONVEYING EQUIPMENT
DIVISION OF THE WRIGHT FILE CO.
LISBON, OHIO

900 tons, transmission towers, Public Service Electric & Gas Co., Newark, N. J., to Bethlehem Steel Co., Bethlehem, Pa.

850 tons, Piels Brewery addition, Brooklyn, to Bethlehem Steel Co., Bethlehem, Pa.

520 tons, laboratory and boiler house, Phizer Co., Groton, Conn., to Belmont Iron Works, Eddystone, Pa.

400 tons, maintenance and service buildings, San Antonio, Tex., for San Antonio Transit Co., to Muskogee Iron Works, Muskogee, Okla.

345 tons, St. Catherine's high school, Racine, Wis., to Milwaukee Bridge Co., Milwaukee.

344 tons, addition to paper mill, Tuscaloosa, Ala., for Gulf States Paper Corp., to Ingalls Iron Works Co., Birmingham, Ala.; H. K. Ferguson Co., Cleveland, contractor.

265 tons, boiler supports, awarded through Combustion Engineering Co., for a project in Dayton, O., to an unnamed fabricator.

245 tons, research building, Cluett Peabody & Co., Troy, N. Y., through George A. Fuller Co., New York City, to Lehigh Structural Steel Co., Allentown, Pa.

200 tons, alterations to Edison building, Chicago, for Commonwealth Edison Co., to Bethlehem Steel Co., Bethlehem, Pa.

200 tons, Gila river substation, spec. 1616, Araby, Ariz., for U. S. Bureau of Reclamation, to Emsco Derrick & Equipment Co., Los Angeles.

130 tons, boiler supports, for a power plant at Sewaren, N. J., awarded through the Combustion Engineering Co., New York, to Lehigh Structural Steel Co., Allentown, Pa.

120 tons, boiler supports, power plant, Long Island Lighting Co., Port Jefferson, N. Y., through Combustion Engineering Co., New York, to Harris Structural Steel Co., that city.

STRUCTURAL STEEL PENDING

6600 tons, Veterans hospital, Fort Hamilton, Brooklyn, N. Y., bids closed Feb. 22.

5200 tons, Veterans hospital, Albany, N. Y., Harris Structural Steel Co., New York, low bidder.

5200 tons, Veterans hospital, Buffalo, Bethlehem Steel Co., Bethlehem, Pa., low bidder.

2000 tons, state bascule bridge, Clifton, N. J., on which bids were opened Feb. 13; action postponed indefinitely.

1100 tons, structural plate steel; also 500 tons, galvanized steel angles; 400 tons, galvanized flat sheets; 450 tons, low carbon steel, Air Materiel Command, Wright Field, Dayton, O.; no bids received, Inv. 256.

1100 tons, school No. 26, Queens, New York city, bids postponed from Feb. 17 to Mar. 4.

1100 tons, school No. 157, Queens, New York city, Harris Structural Steel Co., New York, reported low.

600 tons, school No. 92, Brooklyn, N. Y., Roth-Schenker, Manhattan, New York city, low on general contract.

600 tons, municipal bascule bridge, Unionport, Bronx, New York city, bids extended to Feb. 21.

600 tons, state overpass, over Delaware Lackawanna & Western, near Clifton, N. J.; James Mitchell, Jersey City, low on general contract.

420 tons, diesel shop, Barstow, Okla., for Atchison, Topeka & Santa Fe Railroad; bids Jan. 27 rejected; reported erroneously last week to Consolidated Steel Corp., Los Angeles.

405 tons, railroad grade separation W 2V-F, Fayette county, Ill., for State Highways Division; bids Feb. 7 rejected; new bids Feb. 28.

240 tons, building, Sioux City, Iowa, for Metz Bakery.

170 tons, including 35 tons reinforcing, highway bridge in Alaska; bids to Federal Works Agency, Juneau, Alaska, Mar. 4.

140 tons, building, Chicago, for Sherw Williams Co., bids Jan. 23 rejected.

100 tons, Abbott power plant, Urbana, for University of Illinois; Sargent & Lun Chicago, engineers; bids Feb. 21.

Unstated steel girder state bridge, Wahkiak county, Wash.; bids to Olympia, Mar. 4

Unstated, materials for spillway bridge, Bo project; bids to Bureau of Reclamation, D ver, Feb. 25; spec. 1696.

Unstated, steel roof deck for Coulee mach shop; bids to Bureau of Reclamation, D ver, Mar. 28; spec. 1691.

REINFORCING BARS . . .

REINFORCING BARS PLACED

225 tons, building, Robert Gair Co., Cambrid Mass., to Truscon Steel Co., Boston; Thor O'Connor & Co., Cambridge, general c tractor.

REINFORCING BARS PENDING

1225 tons, K St. elevated highway, Washingt D. C.; bids March 14, district commission

880 tons, Veterans' Administration hospital, F Hamilton, N. Y.; also 99,000 square f mesh, bids inv. 76.

338 tons, including 270 tons wire mesh 68 tons bars, paving project F-5, Marsh county, Ill., for State Highway Departme bids Feb. 7.

300 tons, miscellaneous highway projects, Ma son, Wis., for State Highway Commissi bids Feb. 25.

Unstated, 2640-feet, box girder span, Ha Passage, near Tacoma, Wash.; plans Homer M. Hadley, Seattle; bids soon.

Unstated, flat slab concrete bridge, Pac county, Wash.; bids to Olympia, Mar. 4

PLATES . . .

PLATES PLACED

100 tons or more, tank and water tower Merrill, Oreg., to Pittsburgh-Des Moines S Co., Pittsburgh, low, $19,820.

Unstated, three 24-inch discharge pipes Fallon pumping plant, Mont., to Caird gineering Co., Helena, Mont.

PLATES PENDING

500 tons, warehouse, Nurray Corp., Scran Pa.; bids closed Feb. 25.

170 tons, building, Grit Publishing Co., W liamsport, Pa.

165 tons, state bridge, Bedford county, Pe sylvania, bids Mar. 14.

Unstated, also shapes, 150-foot automo ferry for Astoria-Megler route, Colum river; bids to Oregon highway commiss Portland, Oreg., Mar. 25.

Unstated tonnage, elevated steel water t Bureau of Yards and Docks, Navy Dep ment, Carderock, Md.; F. H. Martell low, item one, $80,000; item two, $62,0 spec. 18075.

PIPE . . .

CAST IRON PIPE PENDING

200 tons, Perkins Lane improvement, Sea bids in.

Unstated, 6000 feet, 30-inch water p Salem, Oreg.; $56,000 appropriated; soon.

Unstated, 105,000 feet, 16, 12, 8 and 6-i water pipe; also 190 fire hydrants, etc.; to Yakima, Wash., Mar. 3.

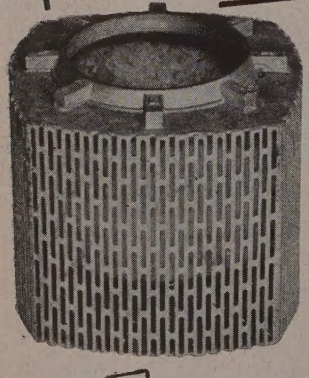
STEEL PIPE PLACED

Unstated, 5600 feet, 12-inch, 10-gage pipe and fittings for Renton, Wash., Pacific Water Works Supply Co., Seattle, $11,012.

STEEL PIPE PENDING

Unstated, 21,400 feet, 10-gage welded water pipe, 8 and 12-inch, for Cedar R Oreg.; bids opened Feb. 20.

Perforated Strainers and —



Hendrick is fully equipped to fabricate a wide range of products from perforated plate, that also involve shaping, forming, welding, riveting, brazing, etc. The pump strainer illustrated is a typical example.

For such operations Hendrick has an exceptionally large stock of dies and patterns, complete tool equipment, and ample forming and welding facilities. Write for detailed information.

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Perforated Metals
Perforated Metal Screens
Architectural Grilles
Mitco Open Steel Flooring,
"Shur-Site" Treads and
Armorgrids

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ROTARY SLITTING KNIVES
for Modern Requirements
Highest Quality . . . Long Service
The Product of Many Years Specialization
MADE BY TOOLMAKERS
Also Manufacturers of
MILLING CUTTERS AND
SPECIAL METAL CUTTING TOOLS

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CLEVELAND 2, OHIO

To Lower your Overhead

BROWNING ELECTRIC
TRAVELING CRANES AND HOISTS
up to 125-TON CAPACITY

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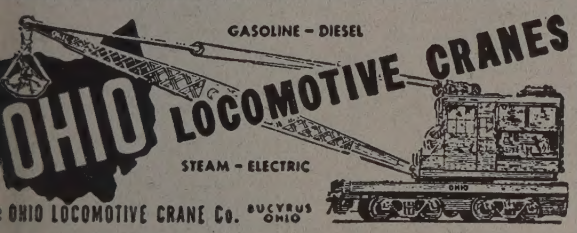
Direct Fired Cover Furnaces... Spheroidizing... Normalizing... Bright Annealing... Patenting and Galvanizing
Lead and Salt Furnaces for Isothermal, Martempering and Austempering Treatments
Salt Bath Descaling Furnaces for Alloy and Stainless Steels, etc.
F. E. I. Combustion Systems



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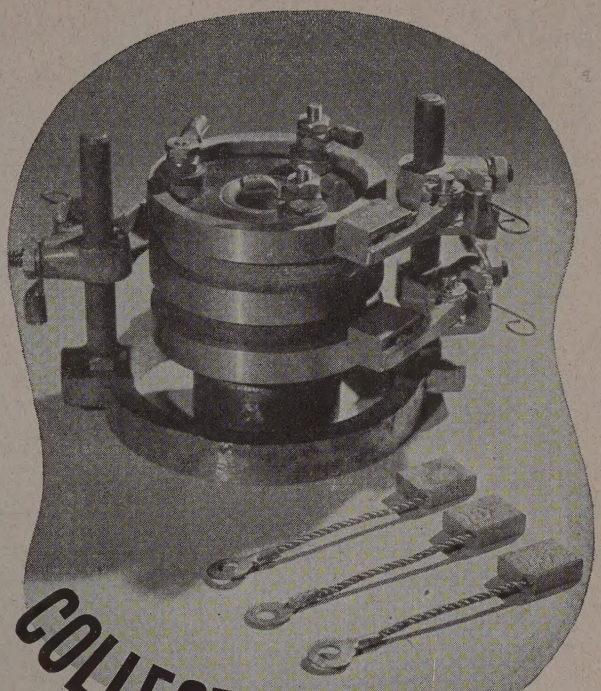
STEEL

Penton Building *Book Dept.* **Cleveland 13, Ohio**



COLLECTOR RINGS

WELCO Collector Rings are made in all sizes to carry currents of 5 to 200 amperes. Two to twelve rings can be furnished on one stub complete with brush holders, brushes, studs for supporting the brush holders and stud rings. The collector rings can be assembled as a unit on one hollow tube with threads on one end and insulation bushing on the opposite end. The brush holders carrying the current are made of brass. The collector rings are made of hard bronze material. Bakelite insulation is used.

Welco Collector Rings are custom-built to fit the special design and functional requirements of your machines or equipment. A limited number of standard types are available. Send us your blueprints and we will design for you the collector rings that are functionally correct.

THE B. A. WESCHE ELECTRIC CO.
1628-25 VINE ST. CINCINNATI 10, OHIO

CONSTRUCTION AND ENTERPRISE

CALIFORNIA

LOS ANGELES—King Industries Inc. has been formed with a capital of $100,000 to manage and operate a general machine shop and manufacturing business. Principal is P. E. King, Whittier, Calif.

COLORADO

DENVER, COLO.—City has received a low bid of $773,131 from Scheumann & Johnson, Seattle, for discharge lines, outlet structures and 16 pump stations for the Roza Division, Yakima project.

GEORGIA

ATLANTA—Atlanta Metallic Casket Co., 216 Elliott St., has awarded a contract to Jiroud Jones, Walton Bldg., for a $90,000 casket manufacturing plant. Architect is A. T. Bradbury, 60 Fifth St.

IDAHO

BOISE, IDAHO—Bids will be received in Boise Feb. 28 for 72 in. valves, controls, shafts, etc., for the Anderson Dam project.

ILLINOIS

CHICAGO—Goodman Mfg. Co., 4834 E. Halstead St., will build a 1-story machine shop and assembly plant costing $350,000. Plans are by Mundie, Jensen & McClurg, 39 S. LaSalle St.

EAST PEORIA, ILL.—Caterpillar Tractor Co., 600 W. Washington St., has awarded a $2 million contract to S. N. Nielsen, 3059 W. Augusta St., Chicago, for a manufacturing plant.

ROCKFORD, ILL.—Rockford Fibre Container Co., 200 Sayre St., will build a $1 million factory.

INDIANA

EVANSVILLE, IND.—Southern Indiana Gas & Electric Co., F. B. Culey, exec. vice president, Hulaman Bldg., plans power plant additions and improvements estimated at $3,675,000.

NOBLESVILLE, IND. — Firestone Industrial Products Co. plans a $1 million project which includes shipping building, warehouse, laboratory and office.

KANSAS

INDEPENDENCE, KAN.—Sinclair Refining Co. has awarded a $2,100,000 contract for a 50-mile, 18-in. pipeline, to O. C. Whitaker Co., Ft. Worth, Tex.

KENTUCKY

COVINGTON, KY.—Donaldson Co. will build a $51,000 addition to its plant for manufacture of parts for automobile filters.

ELIZABETHTOWN, KY.—Nolin Rural Electric Co-operative Corp. has $300,000 for 139 miles of line and system improvements.

LOUISVILLE, KY.—Girdler Corp., manufacturer of chemical, food and electrical-heating equipment, will erect an addition to cost $65,000.

LOUISVILLE, KY.—International Harvester Co., 1326 W. Walnut St., will build two manufacturing plants costing $55,000. Contractor is Struck Construction, 147 N. Clay St.

RUSSELL, KY.—Chesapeake & Ohio Railway, L. T. Nuckols, chief engineer, 825 E. Main St., Richmond, Va., has awarded a $834,000 contract to Hughes Foulkrod Co., 1505 Race St., Philadelphia, for construction of steel car shops.

SHELBYVILLE, KY.—Shelby Rural Electric Co-operative Corp. will spend $220,000 for 125 miles of line.

LOUISIANA

BELLE CHASSE, LA.—California Oil Co. has plans for additions to existing plant and construction of 2-story building for machinery. Cost will be $75,000.

LAKE CHARLES, LA.—Halliburton Oil Well Cementing Co. has plans for construction of $100,000 plant just north of here.

PLAQUEMINES PARISH, LA.—Freeport Sulphur Co., New York, will soon request bids for a $140,000 project which includes machine shop buildings and a water reservoir.

MARYLAND

BALTIMORE—Bethlehem Steel Co. has plans completed for addition to building at 1900 Frankford Ave. to cost $27,000. Owner will build.

BALTIMORE—Standard Oil Development Co., 500 N. Broad St., Elizabeth, N. J., plans refinery additions to cost $150,000. Contractor is Consolidated Engineering Co., 20 E. Franklin St.

BALTIMORE—J. H. Filbert Inc. has awarded contract to Armiger Construction Corp., 2127 Maryland Ave., for construction of a manufacturing building and loading dock to cost $200,000.

MICHIGAN

ADRIAN, MICH.—Adrian Production Tool Co., 320 W. Maumee, has been formed with a capital of $132,000 by R. W. Melbourne as a general manufacturing business.

CHELSEA, MICH.—Wm. A. Thomas Co., 1025 Trinkle Rd., has been formed with a capital of $50,000 to manufacture and sell tools, dies, jigs and fixtures. George R. Snider is principal.

DEARBORN, MICH.—Sharon Steel Products Co., 6837 Wyoming, has been formed by Sharon Steel Corp., Sharon, Pa., with a capital of $500,000.

DETROIT—Sentinel Mfg. Co., 5465 Lincoln, has been formed by Maurice H. Schultz with a capital of $50,000 as a stamping and assembly shop.

DETROIT—Haller Machine & Mfg. Co. Inc., 7940 Tireman Ave., has been formed by John J. Haller with a capital of $75,000 as a general tool, die and stamping business.

DETROIT—Reynolds-Schaffer Co., 12100 Cloverdale, has been formed by Earl C. Reynolds with a capital of $50,000 to manufacture and repair electrical pumping systems.

DETROIT—Secord Sales Corp., 2500 David Stott Bldg., has been organized with a capital of $50,000 to manufacture and sell machines, tools and instruments.

DETROIT—Welding Sales & Engineering Co., 8750 Grinnell Ave., has been organized by Walter H. Simmons with a capital of $125,000 as a general manufacturing business.

DETROIT — Perfection Automotive Products Corp., 931 W. Elizabeth St., has been formed by S. J. Wallach with a capital of $200,000 to manufacture and sell automotive parts.

FRAZER, MICH. — Forever Stainless Corp., 32890 Groesbeck Highway, has been organized by Kenneth M. Smith with a capital of $50,000 to manufacture and sell household utensils and appliances.

GRAND HAVEN, MICH. — Sure-Line Screw Products Corp., 734 Park St., has been organized by Martin Stuit with a capital of $50,000 to manufacture and sell machine products.

GRAND RAPIDS, MICH.—Aluminum Per-Mold Casting Co., 500 Michigan Trust Bldg., has been formed by John R. Sharp with a capital of $50,000 to manufacture and sell aluminum castings.

GRAND RAPIDS, MICH.—Oliver Machinery Co. is planning construction of a $50,000 factory addition.

MUSKEGON, MICH.—Hy-Rota Corp., 1379 S. Convoy Ave., has been organized by John L. Jones to design and manufacture hydraulic and associated equipment. Capitalization is $50,000.

NORTHVILLE, MICH. — Michigan Powdered Metal Products Co., 456 E. Cady St., has been formed by John J. Haller with a capital of $50,000.

ST. JOHNS, MICH.—Arbor Tool Co., Detroit, plans construction of a $150,000 wire assembly plant. Architect is St. Clair Pardee, St. Johns.

NEW YORK

ST. GEORGE, N. Y.—L. A. Dreyfus Co. plans a $412,000 manufacturing and office building.

OHIO

ASHTABULA, O.—Electro Metallurgical Co. will build a $200,000 power plant.

CLEVELAND—General Electric Co., Nela Park will build a $193,000 addition to its lamp base plant.

CLEVELAND—Keystar Castings Corp. has been formed to produce aluminum castings. Russell W. Stumpf is principal of the new firm which is building a 4000 sq ft plant at 4855 Warner Rd.

CLEVELAND—Cutting Tools Inc. has been formed at 13503 St. Clair Ave. by Robert E. Griese to distribute cutting tools.

PENNSYLVANIA

PHILADELPHIA—Newman & Co. Inc., Drexel Bldg., has plans under way for a manufacturing, storage and office building to cost $1 million.

RHODE ISLAND

PAWTUCKET, R. I.—New England Telephone & Telegraph Co., 50 Oliver St., Boston, plans to build a 3-story telephone exchange costing $500,000.

TEXAS

BELTON, TEX. — Brazos River Transmission Electric Co-operative will build a $2 million steam plant near here.

BISHOP, TEX.—Celanese Corp. of America has awarded a $137,000 contract for expansion of its chemical plant and for three railway spur tracks to Tellepsen Construction Co., 3900 Clay St., Houston.

FREEPORT, TEX.—Dow Chemical Co. plans construction of a $3,300,000 caustic finishing plant.

HOUSTON, TEX.—Baash-Ross Tool Co., 5300 Clinton Dr., will build an $80,000 plant expansion.

HOUSTON, TEX.—Humble Oil & Refining Co., 1216 Main St., has awarded a $160,000 contract for a 70-mile, 12-in. pipeline to Morris Bros. Construction Co., Odessa, Tex.

HOUSTON, TEX.—American Smelting & Refining Co. plans construction of a $500,000 plant on the ship channel.

HOUSTON, TEX.—Gulf Chemical Co. plans construction of a $400,000 plant on the ship channel.

SINTON, TEX.—San Patricio Electric Co-operative Inc. will spend $260,000 for 219 miles of line and system improvements.

CANADA

WINNIPEG, MAN.—Thor Machine & Iron Works, with H. Rudy, 410 Talbot Ave., principal, plans construction of iron works here estimated to cost about $75,000, excluding equipment.

GANANOQUE, ONT.—Ontario Steel Products Ltd., King St., Toronto, has awarded general contract to Ross Richardson, Gananoque, for construction of a plant addition here to cost about $55,000.

MONTREAL, QUE.—International Harvester Co. of Canada Ltd., Hamilton, is asking bids through Ross, Patterson, Townsend & Houghan, architects, Dominion Square Bldg., for construction of plant to cost about $350,000.

MONTREAL, QUE.—Standard Desk Manufacturers Ltd., 4157 St. Antoine St., is receiving bids for construction of plant to cost about $125,000.

UNITY, SASK.—Prairie Salt Co. Ltd., Sun Life Bldg., Montreal, Que., will build a $1 million salt development project. Contractor is General Petroleums Ltd., 509 Eight Ave. W., Calgary, Alberta.